

AGRICULTURAL STATISTICS IN INDIA

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DHANPAT RAI & SONS
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BY THE SAME AUTHOR

India's Food Resources and Population
Agricultural Planning for 700 Millions in India.
Ceylon Agriculture—A Perspective.
Economic Problems of Indian Agriculture*
Economic Theory as applied to Agriculture*

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Introduction

With the emphasis on economic planning, of which agricultural development is an essential constituent and the rising demand for agriculturally trained personnel for employment, the number of agricultural colleges and students has appreciably increased in the country during recent years. So much so that each State is planning to have an agriculture University of its own.

Setbacks in agricultural extension programmes and lack of adequate success on the agricultural front in the country with an essentially technical approach have drawn attention to the need for agricultural economic studies and integration of economic and technical approach in agricultural planning and extension. Such studies if they have to come to any meaningful results must necessarily depend upon a sound and comprehensive statistical frame-work.

There is, at present, no study available which can serve as a guide to all those interested to know about the nature and scope of agricultural statistics and use them for their day to day purposes. With the ushering in of the 'Green Revolution' and 'New Strategy' there is an increasing awareness of agricultural statistics in India. As a consequence of the nationalisation of 14 major Banks in the country and Government schemes to expand agricultural credit, the need for knowledge about agricultural statistics and limitations from which they suffer has grown for the vast banking community.

This book has been organised to overcome these difficulties. It should be useful and of interest to students of economic problems of Indian agriculture in particular, educated farmers, political leaders, Bank Managers and planners in India as well as abroad in general.

The study discusses at length the nature, scope, development and availability of various types of agricultural statistics in India. The information consolidated here is otherwise so

(iv)

scattered that credit can rightly be taken for bringing it together, for the first time in a study on agricultural economics. Obviously a good deal of material presented has been obtained from numerous books and official publications which it is difficult to acknowledge individually. Much of the information is from the Directorate of Economics and Statistics, Ministry of Food, Agriculture, Community Development and Cooperation, the help of which is gratefully acknowledged herewith.

Quite a number of colleagues have spent time and offered valuable comments to improve the study. Dr. G.D. Agrawal who has been associated with teaching, examining and formulation of syllabi as well as with research in agricultural economics and is at present holding a senior post in the Food and Agriculture Organisation of the United Nations provided valuable guidance and comments on an earlier draft. Dr. Vidya Sagar who is also now with the FAO, undertook the laborious task of going through an earlier manuscript while he was in the Planning Commission, Government of India. I owe a debt of gratitude to them and other friends.

No one is more conscious of the need for improvements in this book than the author himself, but the main intention in bringing it out is that once the frame-work has been soundly designed it is easier to take care of details even later. The responsibility for any views, commission or omission is that of the author alone and none of his previous or present official agencies with whom he has been or is associated.

*New Delhi,
August 1970*

P. C. B.

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Agricultural Statistics and their Development in India

Nature

AGRICULTURAL STATISTICS refer to information presented quantitatively, *i.e.*, in figures, on the various aspects of agriculture in general or with reference to a country or region. Obviously it can be used only in respect of those items and attributes which are amenable to some sort of measurement. For example, the surface of land is measurable in area units—acres or hectares ; farm products can be measured in units of weight or volume and the income from a crop can be measured in terms of the currency, *i.e.*, rupees. Certain attributes, *e.g.*, quality of management cannot be expressed in figures, hence, they are not amenable to statistical expression. Once statistics on an item or feature of farming is available, it has to be so compiled and organized as to be useful.

A description of various statistical techniques of collecting agricultural information or their analysis, better known as analytical statistics, is outside the scope of this study which is concerned only with the nature of agricultural statistics available, or those that should be made available, their role and their development. If there is a discussion on the assembling of certain information, such as on prices, it refers mainly to a description of the method of collection and obvious weaknesses in it in order to understand the extent to which they are usable for certain purposes and the direction in which improvements are needed. For sampling techniques, statistical analysis,

etc., the reader has to refer to books on mathematical or analytical statistics.

In order to understand the nature of agricultural statistics more fully, they may be classified into the following broad groups.

1. Land utilization and irrigation.
2. Agricultural production—arable, plantations, livestock and fisheries.
3. Forestry.
4. Agricultural prices and wages.
5. Statistics relating to agricultural organization and farming structure, *e.g.*, persons employed in agriculture, their status, land held under various tenures, size of holding, number of draught cattle, implements, machines, farm buildings, etc.
6. Statistics on economics of production and marketing, *i.e.*, cost of production, inputs, input-output ratios, marketing charges, marketing spread over, etc.
7. General statistics, literacy among those employed in agriculture, health, sanitation, etc. Rainfall and its distribution, temperature and its range, etc.
8. Forecasts—weather, crops, prices.

Each of the groups mentioned above is fully dealt with in respect of their present position, drawbacks, role and improvements needed in the later chapters. Some general idea may, however, be formed from what is stated below.

The total area of land surface is recorded according to various uses, *i.e.*, forests, farming, fallow waste land, roads, buildings, mines, etc. ; where land statistics are advanced each area has detailed classification according to soil type, quality and grade. Further, area statistics have a breakdown for each crop, under pasture, double cropped, irrigated, rainfed, etc.

Yields are given crop-wise per unit of area and production per crop is given for various geographical units. The production figures refer to field crops, livestock, fishery, poultry, etc. In forestry they refer to various forest products, *e.g.*, timbers, grasses, resins.

Irrigation statistics give information on area irrigated—gross and crop-wise, source of irrigation, method of irrigation, number of wells

and tanks, those fallen in disuse, etc. With emphasis on agricultural planning, statistics on farm labour, wages, size of farms, tenure relationship, other farm inputs, *e.g.*, fertilizer, insecticides, equipment, contribution to national income, etc. are gaining importance. So are the forecasts relating to weather, production and prices. Outlook studies on prices are not advanced yet.

Scope

Agricultural statistics have a very wide coverage and their scope is ever widening. Detailed agricultural statistics are needed for agricultural policy decisions, planning agricultural development and estimates of national income. The chapters that follow deal with the subject in detail.

Development of Statistics in India

The development of agricultural statistics in India is described with reference to different periods as follows :

1. Statistical set-up in ancient India.
2. Statistical organization during 19th century.
3. Statistical organization upto World War I (1901—18).
4. Growth of statistical organization during inter-war period (1919—39).
5. War-period developments (1939—45).
6. Post-war period (1946 onwards).
7. Present-day organization of—
 - (i) the Central Government ; and
 - (ii) State Governments.

Statistical Set-up in Ancient India

In ancient India, mention may be made of the *Ramayana* period in which statistics of employment, unemployment and taxes were collected during the reign of king 'Bharat'. Kautilya's *Arthashastra* makes mention of the statistical agency maintained by the State. It contains details of the economic condition of the Indian people during this period. Statistics of land area, agricultural production, population and taxes were collected through an organized machinery during the reign of Mauryan kings, Gupta dynasty and Kushans.

Price statistics of agricultural and other products are available in detail in Administration Reports of Alauddin Khilji. Statistics relating to the cost of constructing roads, bridges, tanks, hospitals,

schools and other buildings of public welfare are available in the State Papers of Sher Shah. His State Papers also contain statistical information regarding cost of building materials like lime and mortar, wages to labourers and architects, details of crimes in the country and punishments awarded by the State.

Statistics of acreage and yield are also available in historical records of the Moghul period. Among the prominent records of this period, mention may be made of *Tuzk-a-Babri* and *Ain-i-Akbari*. The latter contains elaborate statistical information about land, production, population, famines and other economic details during A.D. 1556 to 1605. This monumental work of Akbar's time also contains details of army personnel, arms and ammunitions used, coins manufactured, state properties and also policies on the fixation and collection of land revenue which were based on agricultural production. Acreage details of land along with the method of its measurement are also given in it.

After the downfall of the Moghul Empire, the East India Company maintained full accounts of exports and imports. With the extension of the company's suzerainty over the country, statistical data began to be collected in greater detail.

Later, during the 18th century, when the ryotwari system was introduced in some parts of India, land revenue officers were appointed by the Company to collect figures of land revenue, cost of cultivation and price of agricultural produce. Land revenue under this system was based on agricultural production and fertility of the soil. However, during this period the statistics of acreage and production of crops were not collected for the whole country. At places where the Government introduced the system of permanent land settlement, the collection of revenue was entrusted to agents known as revenue farmers. The company was, therefore, interested in acreage and production statistics of these areas. During the 18th century, no separate statistical organization existed, even though statistical information had accumulated through the administrative activities of the Company.

The 19th Century

It was during the later half of the 19th century that need was felt for the proper collection of statistics, especially in the field of agriculture, due to the occurrence of famines. The famine of 1860 was a very severe one and the government had to take steps to save the population from starvation and death. Up to this time no census

of population for the country as a whole had been attempted. The decennial census was introduced in India in 1872 but its coverage was limited and did not include the whole of India. The first decennial census in its proper form was conducted in 1881. Even at this stage, the census organization was *ad hoc* and immediately after the census was over, the entire organization was liquidated. This practice continued up to the census of 1941. The census organization was made permanent as late as 1949 during the post-independence period. The appointment of the Registrar General was made for the period of the census only.

The first Indian Famine Commission, 1880, recommended the appointment of a Director of Agriculture and a few statistical officers in each province to assist him in the collection of statistics and maintenance of detailed records of acreage and production. The recommendations of this Commission were accepted by the Government of India and the Central Department of Agriculture was established in 1871. Later, Departments of Agriculture were also established in various provinces to assist the Central Department.

Prior to eighteen sixties, whatever statistics were collected as a by-product of administration suffered very much in quality and lacked comprehensiveness. The first significant development was the setting up of a Statistical Committee in 1862 for the preparation of model statistical forms for the compilation of a uniform system of Imperial Statistics. The forms of statistics recommended by the Committee related to the collection on industry, trade, finance, education, judiciary, population, agriculture, livestock and mining, and the local administrators were asked to adapt statistics already possessed by them or available to them to these uniform forms. This led to the publication, in 1868, of the *Statistical Abstract of British India*, based on the returns of the local administrations, and containing useful statistical information for all the British provinces. The publication became an annual feature by 1923. It was started mainly for the benefit of industrialists and traders in London.

In 1874, Sir John Strachey, the then Governor of North West Province (now Uttar Pradesh) wrote to the Government suggesting the creation of a department for collecting statistical information regarding trade and agriculture. He also suggested the appointment of a Director of Agriculture and Commerce. Accordingly, in 1875, a Department of Agriculture and Commerce came into existence, and

its functions were to collect trade statistics, improve the quality of agricultural statistics and improve the system of agriculture. This was then the first Government department, having something to do with the collection of basic data, although this was not its only function.

The preparation of the Gazetteers of India, containing a mass of useful economic statistics relating to each province, which started in 1866 with a study relating to the Madras Presidency, marked another important stage in the development of statistics. An *ad hoc* Director General of Statistics was appointed under the Department of Agriculture, Revenue and Commerce, for organizing this work on uniform lines. *The Imperial Gazetteer of India* was published for the first time in 1881. This official publication contained detailed statistical records relating to economic conditions of different parts of the country.

In 1883, a statistical conference was held at Calcutta. The conference recommended the setting up of an institution of all-India crop forecasts, and conducting the quinquennial livestock census. Both these recommendations were accepted by the Central Government which directed the Provincial Governments to co-operate in the matter. Accordingly the first crop forecast of wheat production was started in 1884 and many other crops were added to the list later on. By 1900, among others, the crops included in the forecasts were rice, oilseeds, cotton, jute and sugarcane. The Revenue and Agriculture Department of the Government of India published for the first time in 1886 *Returns of Agricultural Statistics of British India*. It continued to appear annually. The first livestock census was conducted in 1887-88.

The Finance and Commerce Department of the Government of India compiled and published figures of foreign trade, exports and imports till the end of the 19th century. In 1895 the Government established a Statistical Bureau at the Centre to deal with agricultural and foreign trade statistics of the country. This Bureau functioned till 1922 under the guidance and supervision of the Director General of Statistics.

In fact, during the 19th century, no serious efforts were made on the part of the Government of India to collect economic statistics.

Pre-World War I (1901-1918)

The beginning of the twentieth century witnessed far reaching improvements, in the statistical set-up of the country. The establish-

ment of the Department of Commercial Intelligence and Statistics at Calcutta in 1905 proved beyond doubt the seriousness of the Government in the collection of statistical data. The main purpose of this new department was to maintain a link between the Government of India and the business community. It was also entrusted with the task of compiling business and trade statistics of the country for public use. The Statistical Bureau under the guidance of the Department of Commercial Intelligence and Statistics, Calcutta, published for the first time the *Indian Trade Journal* in 1906. This monthly publication still continues and provides valuable statistical information pertaining to trade and business. The main functions of the Department of Commercial Intelligence and statistics were :

- (i) to collect commercial statistics to help trade and business ;
- (ii) to provide a link between Indian and foreign businessmen ;
- (iii) to compile and publish statistical information in the Journals and *ad hoc* bulletins ; and
- (iv) to compile and publish statistical data previously published by the Government of India on subjects of commercial, judicial, administrative and agricultural importance.

Immediately after 1912, the year when the headquarters of the Indian Government were shifted from Calcutta to Delhi, it was decided to separate the Statistics section from Commercial Intelligence, but the separation was temporary. In 1922, the Statistics section was again amalgamated with the Department of Commercial Intelligence. This new Department was named as the Office of the Director General of Commercial Intelligence and Statistics and was located at Calcutta.

The following journals were published by this office.

Annual—

- (i) *Review of Trade of India.*
- (ii) *Statement of the Foreign Sea-borne Trade and Navigation of British India.*
- (iii) *Statistical Abstract for British India.*
- (iv) *Estimate of Area and Yield of Principal Crops in India.*
- (v) *Agricultural Statistics of British India.*

Quinquennial—

- (i) *Index Number of Indian Prices.*

Quarterly—

- (i) *Wholesale Prices of Certain Staple Articles of Trade at Selected Stations in India.*

Monthly—

- (i) *Monthly Statistics of the Production of Certain Selected Industries of India.*
- (ii) *Monthly Statistics of Cotton Spinning and Weaving in Indian Mills.*
- (iii) *Monthly Survey of Business Conditions in India.*
- (iv) *Monthly Accounts Relating to the Sea-borne Trade and Navigation of British India.*
- (v) *Accounts Relating to the Coastal Trade and Navigation of British India.*
- (vi) *Kathiawar and Travancore Trade Statistics*
- (vii) *Indian Customs Revenue Statement.*
- (viii) *Trade at Stations Adjacent to Land Frontier Routes.*
- (ix) *Raw Cotton Trade Statistics.*
- (x) *Monthly Accounts Relating to the Inland (Rail and River-borne) Trade of India.*

Inter-War Period (1919-1939)

Even after this progress in the collection of statistics, the Government of India found then as inadequate during World War I. It was considerably handicapped in the successful prosecution of the war efforts on account of paucity of data regarding the production of various raw materials in the country. However, Government could do nothing to improve the statistical organization during the War.

The Government of India, with a view to developing industries and improving the statistical organization of the country, announced the appointment of the Industrial Commission in 1916. The Commission made thorough observations regarding the responsibility of the Government for collection, compilation, careful analysis and judicious distribution of commercial and industrial statistics and intelligence, both in peace and war. The Commission also recommended the appointment of a Director of Commercial Intelligence to deal with :

- (i) *statistics of foreign trade,*
- (ii) *production and industrial statistics, and*
- (iii) *statistics of trade of India and foreign countries, tariff and industrial policy.*

The recommendations of the Commission in this respect were not accepted by the Government.

Immediately after the winding up of the Industrial Commission, the Indian Economic Enquiry Committee was appointed in 1924 under the chairmanship of the late Sir M. Visvesvaraya. The report of the Committee to enquire into "the question of adequacy of the statistical data available and the desirability and possibility of supplementing it, and of undertaking an economic enquiry was out after a year." The Committee concluded that if statistics in India were to be maintained on a satisfactory basis, all work relating to it should be co-ordinated and centralized as in the Dominions; in other words, the statistics of all departments both of the Central and Provincial Governments should come under the supervision of one central authority who would act as the adviser to the Government in all statistical matters. The committee supported the placing of the entire statistical organization on a statutory basis by enacting a Census and Statistics Act. The Committee identified fields where statistics collected were either incomplete or were totally wanting. Among the valuable findings of the Committee were that (i) the statistics of finance, population, trade, transport, communications, migration and vital statistics were "more or less complete", (ii) production statistics, *i.e.*, statistics of agriculture, pasture and dairy farming, forests, fisheries, minerals, large-scale industries, and cottage industries were complete in some respects but incomplete and wanting, in many others; and (iii) the statistics relating to income, wealth, cost of living index, indebtedness, wages and prices were entirely unsatisfactory and the Government had not made any genuine efforts to improve the position in this respect.

The Committee made a number of recommendations for the improvement of statistics, mainly industrial statistics by conducting quinquennial wage censuses in large industries and collecting statistics of output of raw materials consumed in cottage industries. In brief, the main recommendations of the Committee regarding the improvement of statistical organization of the country were for the establishment of the Central Statistical Bureau and Provincial Statistical Bureaus in

each province to assist the central statistical authority. The recommendations of the Committee were implemented only partially.

Immediately after the conclusion of the Indian Economic Enquiry Committee, the Report of the Royal Commission on Agriculture (India) was out in 1928. One of the responsibilities of the Imperial Council of Agricultural Research proposed by it was to compile and distribute statistical information concerning agriculture and animal husbandry. The Council was also to take over the publication work from the Central Agriculture Department. One of the most important events in the development of statistics in India was the appointment of the Bowley Robertson Committee in 1934 by the Government of India. The Committee was called upon to :

- (i) *facilitate the further study of economic problems of India ;*
- (ii) *give views on existing statistical information and organization with special reference to the gaps ;*
- (iii) *suggest means for filling them ;*
- (iv) *recommend about the organization of a Central Statistical Department to collect and coordinate statistical enquiry for the whole of India ;*
- (v) *discuss the practicability and scope of a census of production ;*
- (vi) *give a critical review of the material available for measuring national income ; and*
- (vii) *give recommendations on the construction of index numbers of prices, wages and production.*

The recommendations of the Bowley-Robertson Committee are a landmark in the development of Indian statistics. Whereas they dealt with the problems of organization for statistics, rural and urban surveys, census of production and Government publications, their most important recommendations were those pertaining to the measurement of national income. Below is given a very brief summary of some of their recommendations relevant to agriculture.

Organization of Statistics. In matters pertaining to organization of statistics, the Committee felt the need of a co-ordinating agency. It recommended the appointment of a statistician for each province to co-ordinate provincial statistics and to conduct supplementary population census in the middle of the decennium, mainly devoted to infor-

mation regarding members of the family, their age, sex and occupation.

Rural and Urban Surveys. The Committee recommended the adoption of a random sample method for rural surveys. For cities, complete census surveys were recommended.

Government Publications. Regarding government publications, the Committee recommended the publication in India of a book on the lines of *Guide to Official Statistics* published in Britain. It would enable any person to know the names of Government and other publications giving statistics pertaining to any field and also giving information regarding the nature and quality of such statistics.

Regarding the current government publications, the Committee observed that these were usually released after a very long interval and were of little use to the public. Instead, it would be better if early publication of popular and easily available publications were encouraged.

National Income. The recommendations regarding statistics of national income are discussed in a separate chapter.

All the recommendations of the Committee were not accepted by the Government but some of those which were accepted were immediately implemented. It was the result of the recommendations of the Committee that the office of the Economic Adviser to the Government of India was created in 1938 to collect and analyse economic statistics. Soon after the establishment of this office, World War II broke out.

War Period Development (1939-1945)

During World War II, the Government of India, again found itself face to face with the same difficult plight as during World War I of the lack of a well-developed statistical organization to cope with the various problems of war emergency such as control over prices, rationing of food supplies, allocation of funds and goods for defence purposes, imports of food, etc. As a result of this emergency, small statistical organizations were hurriedly established in various departments of the Government of India and also in State Governments to collect the desired statistics. It was in 1944 that the Economics and Statistics Section was created in the Central Department of Agriculture. As an aid to the collection of industrial statistics, the Industrial

Statistics Act was passed in 1942. Later the Directorate of Industrial Statistics was established in 1945.

In the same year, the Government of India set up an inter-departmental committee with the Economic Adviser to the Government of India as its Chairman to consider the statistical material available and make recommendations for filling up gaps, and for improvement in the existing organization. Among the organizational recommendations was a scheme for the decentralization of primary responsibility for departmental statistics coupled with the formation of a Central Statistical Office for co-ordination, institution of a statistical cadre, establishment of statistical bureaux at the headquarters of State Governments and the preparation of overall statistics for the entire country.

Thus, during the British period, the statistical development was limited, depending mainly on the requirements for administration of the country. A proper statistical organization in the country was not built up, although many committees gave thoughtful consideration to this problem and made valuable recommendations.

Post-War Period

After the war, tremendous developments took place in the field of collection and analysis of statistics in India. One of the main reasons for this has been the urge for the rapid economic development of the country after independence and the realization by the Government that economic planning cannot take place without adequate knowledge about the existing economic resources.

Immediately after Independence in 1947, the Economic Adviser's office started the publication of 'General Purpose Whole-Sale Price Index Numbers.' The Labour Bureau also started constructing the cost of living index numbers for certain rural and urban areas with the base year 1939. All these index numbers have later been revised and the base years shifted to more recent years.

In 1948, the Directorate of Economics and Statistics was set up under the Ministry of Food and Agriculture and it took over from the Directorate General of Commercial Intelligence the collection of statistics relating to land utilization, crop production, plantations, agricultural prices, agricultural wages, forests, food distribution, and the Grow More Food campaign.

In 1949, the Reserve Bank of India started a new publication

called '*Annual Report on Trend and Progress of Banking in India.*' This annual volume gives detailed statistics pertaining to all kinds of banking institutions operating in India. Later, the Reserve Bank of India published an *ad hoc* volume *Monetary and Banking Statistics of India.* This comprehensive volume provides at one place all monetary, banking and insurance statistics of India from 1900 to 1952.

In the same year, 1949, the Government of India appointed for the first time the National Income Committee to give an estimate regarding national income of India and also to suggest a technique for its measurements every year on a regular basis. The Committee estimated India's national income for a number of years and also pointed out difficulties in its measurement by the social accounting method. Since 1954 a National Income Unit has been permanently attached to the Central Statistical Organization of India for the purpose.

In the year 1949, a statistical unit was established at the Centre to co-ordinate all statistical activities in the country. Gradually this statistical unit developed into a full-fledged Central Statistical Organization (C.S.O.) of the Government of India in 1951. In the same year, the Census Act was made permanent and the offices of the Census Commissioner and Registrar General of India were set up at New Delhi. Statistical bureaus have also been set up in the states.

The Directorate of National Sample Surveys was set up in 1950 under the Ministry of Finance, Government of India, with a view to compiling and collecting statistics on economic and social aspects of life in the country.

In 1951, an International Statistical Conference was held at Calcutta to discuss the common statistical problems of different nations and to suggest improvements with a view to bringing uniformity in the different concepts and terms used in the collection and compilation of statistical data.

The Collection of Statistics Act, passed in 1953, empowered the State Governments as well as the Central Government to collect all economic and commercial statistics in the country. The All India Rural Credit Survey was conducted in 1951-52 to collect statistics of rural indebtedness and other problems of rural finance. As a result of the recommendations of the Survey, the Imperial Bank of India was nationalised on July 1, 1955. All India Agricultural Labour Enquiries were conducted in 1950-51 and 1956-57.

World Agriculture Census

In 1958 the Government of India was informed of the proposal of undertaking a World Census of Agriculture in or around 1960 sponsored by the FAO and it was decided that the data required for the purpose might be collected through sample surveys. Accordingly a survey of land holdings was conducted by the Directorate of National Sample Survey (July 1960—August 1961) in the rural sector to study the structure, distribution and utilization of agricultural holdings. The design of the survey was a stratified two-stage one where the villages were the first stage units and households the second stage. In the schedules adopted for the survey, there was provision for the collection of information on the following items :

- (i) Holder, holding and tenure particulars giving details of area owned, area leased in and leased out, terms of leasing in and leasing out etc. ;
- (ii) land utilization particulars ;
- (iii) area under crops ;
- (iv) demographic particulars of the members of the sample households ;
- (v) irrigation and drainage facilities on the farm ;
- (vi) use of fertilizers and soil dressings ; and
- (vii) number of livestock and poultry and agricultural implements and machinery.

The survey was repeated during the 17th round (September 1961—July 1962) of the National Sample Survey and the coverage was extended to urban areas also. Estimates for the various characteristics under study for the States and the country as a whole have been given in the 17th round report on land holdings. It is intended to carry out the 1970 Census of Agriculture in collaboration with the FAO again.

The Indian Statistical Service

Realizing the role which statistics will have to play in a developing economy, the Government of India recently constituted a cadre of professional statisticians known as the Indian Statistical Service (ISS). For entrants at various levels 'In-Service Training Programmes' were drawn up by an *ad hoc* committee of expert statisticians and approved by the Government of India for implementation. A staff

college for training of statistical personnel is proposed to be established shortly.

The Plans

The new responsibilities for wider social and economic functions of the Government have led to a further demand for and impetus to the development of comprehensive statistics. More important was the emphasis, from the point of view of overall economic policy, on a single synoptic picture of the information field, and consequently on proper co-ordination and control. With the formulation of the First, Second and Third Five Year Plans the need for new types of statistics for judging the progress of the Plan schemes, overall assessment of the Plans and evaluation surveys was felt and suitable orientation of the existing statistical system both at the Centre and States was attempted. An additional stimulus was provided by the growing statistical requirements of international organizations such as the United Nations and its specialized agencies, and their attempts to promote suitable statistical standards of international comparability with a view to developing an integrated statistical system.

Between 1960-61 and 1968-69 over Rs. 10 crores were spent on schemes for statistical improvement under the Department of Statistics. In addition, Rs. 4.5 crores were spent on statistical schemes under various sectoral programmes for agriculture, industry and health. Among the more significant improvements achieved during this period are : revision of national income estimates on the basis of better data and more refined methods of estimation ; progress towards compiling comparable estimates of income originating in different States for the commodities producing sectors ; refinements in the construction of the index numbers of industrial production and the cost of living ; extension of the coverage of crop statistics to new area and more crops ; introduction of a rationalised supervision of village agencies responsible for collecting area statistics ; and introduction of surveys to assess spread of improved agricultural practices. At the State level, the Third Plan included nine core schemes to fill major gaps in small scale industries in the unorganised sector, distributive trade, goods transport by road, housing statistics and estimation of State income. In 1966 the Department of Statistics set up a computer centre in Delhi with three computers. Seven more computers have been installed in different regional centres. The establishment of these centres is designed to increase the efficiency of collation and analysis of the statistical

data and to reduce the time lags in making the data available to the users.

Even in areas which are covered by the existing system, there is scope for improvement both in quality of information and in the timely availability of such data. The Fourth Plan will make a continuing effort for improvement in this direction. The existing machinery for collection of data in different Ministries and Departments is being reviewed with the object of evolving a system which will make for better and timely availability of information relevant to Plan formulation and evaluation and for Government policy. The Planning Commission has made detailed suggestions to the States regarding collection and analysis of data relevant to sectoral planning at the district level.

The following main considerations have guided the formulation of the statistical schemes :

- (i) maintaining continuity in the implementation of important statistical programmes undertaken since the Third Plan ;
- (ii) extending statistical development to new areas of enquiry ; and
- (iii) undertaking projects on the basis of international statistical programmes.

The total Plan provision for the schemes under the purview of the Department of Statistics in the Final Fourth Plan has been placed at Rs. 8.74 crores of which Rs. 4.95 crores are provided for the Central sector and the balance of Rs. 3.79 crores for States and Union Territories. The main objectives of statistical schemes in the Central Sector will be increasing the coverage and ensuring timely analysis of industrial statistics, improving crop statistics, promoting State income estimates and improving national accounts and strengthening of research and training facilities. Out of the outlay of Rs. 1.2 crores, for the various statistical schemes of the Indian Statistical Institute, a major portion is earmarked for capital expenditure on purchase and development of land and construction of building. The balance is intended to be spent on research activities. In the States' sector, stress will be placed on the implementation of 'core' statistical schemes, with a view to improving data on small scale enterprises, distributive trade and inter-State movement of goods. The Plan provisions for statistical schemes are :

TABLE I
STATISTICS : FINAL FOURTH PLAN OUTLAY

S. No.	Item	Outlay (Rs. lakhs)
(0)	(1)	(2)
1.	Central schemes	495
2.	Improvement of industrial statistics	47
3.	Preparation of up-to-date frame in urban areas	16
4.	Consumer prices index for non-manual employees, revision of samples for collection of prices and house rent in the existing index and fresh middle class family living surveys	42
5.	Promotion of state income estimates and studies relating to national accounts	32
6.	Other schemes including methodological studies	18
7.	Grants-in-aid to ISI	120
8.	Improvement of crop statistics	120
9.	Department of statistics—computer centre scheme	100
10.	States and union territories schemes	379
11.	'Core' and other statistical schemes	379
12.	Total	874

A provision of Rs. 280 lakhs has been made for the statistical schemes of the Registrar General's office. These schemes aim at progressive improvement of civil registration for collection, tabulation and consolidation of vital statistics, and for filling up gaps in vital statistics. These projects, initiated recently, are proposed to be pursued vigorously. A provision of Rs. 16 lakhs has also been made for the schemes of the Director General of Supplies and Disposals for improvement of purchase statistics.

An agricultural census to be conducted during 1970 to collect a comprehensive data on various aspects of agriculture will be a major activity forming part of the world programme of the U.N. statistical wing. A new series of consumer price index numbers is contemplated in the Fourth Plan with a working class family living survey to be conducted in 60 factories. A detailed housing census along with the 1971 population census will be another major activity of the statistical system in the Fourth Plan.

The Indian Statistical System and the Constitution

India being a federation of States, there is a dichotomy of responsibility for government between the Union or Central Government on the one hand, and the State Governments on the other. Under the Indian Constitution, the responsibility is divided on the basis of a three-fold classification of all subjects, viz., Union List, State List and Concurrent List, the last category representing the areas where both the Union and State Governments could operate. At the Central as also the State levels, there is a further division of responsibility, subject wise or group wise, among the different Ministries and departments. The authority and responsibility for collection of statistics relating to particular subject-fields is determined by the overall responsibility for the subject under the Constitution. However, appropriate to the federal set-up, the Central Government acts as the co-ordinating agency for presentation of statistics on an all-India basis, even in fields where the States have the primary authority and responsibility for collection of statistics. The Department of Statistics (of which the Central Statistical Organization is the technical wing), located in the Cabinet Secretariat, is charged with the important function of co-ordinating all statistics at the State and Central levels. The State statistical bureaus, attached to different departments in different State Governments, are charged with the responsibility of co-ordination of all statistics at State level and keeping liaison with the Central Statistical Organization for the purpose of co-ordination at the all-India level.

At the Centre most of the Ministries have either a full-fledged statistical department, a division or section depending upon their needs and upon the stage of development of statistics in the relevant field. At the State level the collection and compilation of statistics relating to the particular field have been assigned to different units, big or small, of various government departments :

States

1. Agricultural Department/ (a) State Statistical Bureau,
Economic and Statistics Department/Planning, Health and
Social Welfare/General Administration Department/
Finance

(Contd.)

<i>States</i>	
2. Department of Agriculture	Statistics Unit, Directorate of Agriculture.
3. Department of Co-operation	Office of the Registrar, Co-operative Societies.
4. Labour Department	(a) Office of the Labour Commissioner. (b) Office of the Chief Inspector of Factories. (c) Directorate of Employment Services.
5. Industries Department	Directorate of Industries.
6. Finance Department	Office of the Commissioner of Excise.

2

Statistical Organisations of Central and State Governments

THE INDIAN Constitution provides for a broadly decentralized statistical system for the country.

The Central Government collects statistics and bears the responsibility for their compilation and publication according to the Union list. The important items in the Union List are :

- (i) Defence,
- (ii) Railways,
- (iii) Posts and Telegraph,
- (iv) Currency and Foreign Exchange,
- (v) Trade and Commerce with foreign countries,
- (vi) Meteorological Organization,
- (vii) Census,
- (viii) Income Tax,
- (ix) Customs and Excise Duties etc., and also inquiries, surveys for the purpose of any of the matters in the list.

In addition, the Central Government have an equal jurisdiction over the items in the concurrent list which includes vital statistics, economic and social planning, trade unions, social insurance, labour welfare, relief and rehabilitation, price control, etc. The Central

Government can also frame laws and issue directives regarding the stated list to State Governments for bringing uniformity in statistics collected by them. In fact, the Central Government works as a co-ordinating agency for the statistics collected by the various State Governments and publishes the statistical information on an all-India basis. To carry on their co-ordination activity, the Central Government established the Central Statistical Organization in 1951 which has a Standing Committee to advise the State Governments in matters pertaining to collection, analysis and interpretation of various statistics.

The number of statistical agencies at the Centre was 102 with an expenditure of about Rs 4.7 millions in 1966, while the corresponding number of agencies was about 270 with an expenditure of about Rs 45 millions in all the States/Union Territories. The largest number of statistical units (19) are attached to the Ministry of Food and Agriculture.

Major statistical organizations in the various Central Ministries and State Governments are as shown in Table 2 and important publications relating to Agricultural Statics in Appendix I.

TABLE 2
MAJOR STATISTICAL ORGANIZATIONS IN THE VARIOUS
CENTRAL MINISTRIES

<i>Central Ministries</i>	<i>Major Statistical Organizations</i>
1. Cabinet Secretariat	(a) Central Statistical Organization. (b) Directorate of National Sample Survey.
2. Commerce	(a) Office of the Director General of Commercial Intelligence and Statistics. (b) Office of the Economic Adviser. (c) Statistics Division, Office of the Chief Controller of Imports and Exports. (d) Economic and Statistics Branch, Office of the Textile Commissioner.
3. Defence	Army Statistical Organization.
4. Finance	(a) Statistics and Intelligence Branch (Central Excise). (b) Statistics Branch, Directorate of Inspection (Income Tax). (c) Department of Statistics, Reserve Bank of India.

(Contd.)

<i>Central Ministries</i>	<i>Major Statistical Organizations</i>
5. Food, Agriculture, Community Development and Co-operation	(a) Directorate of Economics and Statistics. (b) Institute of Agricultural Research Statistics (IARS).
6. Health and Family Planning	Statistical Bureau, Directorate General of Health Services.
7. Home	Office of the Registrar General, India.
8. Labour and Employment	Labour Bureau.
9. Planning Commission	Programme Evaluation Organization.
10. Railways	(a) Statistics Directorate, Railway Board. (b) Statistics Office, Zonal Railways.

At the Centre, most of the Ministries collect or use statistics in some manner or other and have their own statistical units. Some of them located in the administrative departments are engaged in the processing of data which are purely by-products of administration. Examples of such agencies are, Officers of Income-tax Department, Central Board of Revenue, Railways, Posts and Telegraphs and the Directorate General of Supplies and Disposals. There are again some statistical units in Organizations set up for control of production and distribution of products in short supply, and these maintain statistics which are of value alike to government organizations and public. Examples of these are Textile Commissioner's Office, Central Excise Commissioner's Office, Iron and Steel Controller. There are also various Organizations established by the Government specifically for the function of collecting and compiling statistical data.

The statistical units in the various Ministries may be divided into the following four categories according to their functions :

- (i) Organizations possessing data collected in the usual course of official administration and execution of laws. In this category are included statistical sectors of the Central Board of Revenue, Railways, Posts and Telegraphs, Directorate of Supply and Disposal, etc.
- (ii) Organizations associated with control agencies entrusted with the production and distribution of commodities. The examples are : statistical sections attached to the Textile Commissioner, Con-

troller of Iron and Steel, Electrical Commissioner to the Government of India and Controller of Imports and Exports in India.

- (iii) Organizations specially set up for the purpose of collecting and publishing data. Mostly it is such organizations which collect statistics in India. They include the Census Organization; Department of Commercial Intelligence and Statistics, Directorate of Industrial Statistics; Labour Bureau; Directorate of Economics and Statistics in the Ministry of Food and Agriculture etc.
- (iv) Research organizations such as Statistical Division of the Indian Council of Agricultural Research; the Research Department of Reserve Bank of India etc.

The statistical units attached to a few important Central Ministries and others are described below. The publications issued by the units attached to the Ministry of Food and Agriculture are given in Appendix A.

The Central Statistical Organization

This Department is responsible for bringing about the necessary co-ordination between the various statistical agencies, setting up agreed standards and norms and promoting in general the collection and compilation of statistics on scientific lines. Before issuing general directions on statistical standards and norms and methods of collection of data, the Department attempts to arrive at agreed conclusions. The Department has an Advisory body called 'Central Technical Advisory Council on Statistics.' The Council meets at least once a year. A similar body designated as Standing Advisory Committee on Statistics also acts as the Standing Committee to advise the Department of Statistics. The Central Statistical Organization, set up in 1951, works as an attached technical office of the Department of Statistics for statistical matters.

Ministry of Food and Agriculture

The important Statistical units of this Ministry are :

- (i) *Directorate of Economics and Statistics.* This Directorate collects all agricultural statistics which were previously collected by (a) the Department of Intelligence and Statistics, Calcutta (b) the Agricultural Marketing Adviser to the Government of India (c) the Department of Food and (d) the Department of Agriculture. The main

function of the Directorate is to advise the Ministry of Food, Agriculture, Community Development and Co-operation, Government of India on current issues of agro-economic policies arising out of its day-to-day work. While the Secretariat of the Ministry is responsible for taking economic policy decisions on various matters in the sphere of both agriculture and food and implementing these decisions, the work which requires special technical knowledge or detailed examination and analysis from the economic policy angle is done in the Directorate. For this purpose, the Directorate has undertaken to collect, compile, process and maintain agro-economic data and publish standard blue books on them. The nature of data available in the Directorate is indicated below :

Rainfall, land utilization, irrigation, area and production of crops, yield per acre, food statistics (procurement, imports, distribution and stocks on Government account), agricultural prices (wholesale, harvest and retail), market arrivals, forest statistics, livestock statistics, number of agricultural implements, agricultural wages, cotton ginned and pressed, index numbers relating to agricultural economy, cost of cultivation, bank advances against stocks pledged/hypothecated, progress reports regarding foodgrains production schemes, allocation for the agricultural sector under the successive Five Year Plans, etc.

(ii) *Directorate of Marketing and Inspection.* The Directorate collects data and issues *ad hoc* reports on production, transport and marketing of agriculture, live-stock and fishery products including rice, wheat, gram, barley, groundnuts, fish, milk and milk products, etc. The statistics thus collected are being used by the Government of India in formulation of their policy regarding the production and distribution of agricultural products, economic controls, and the fixation of tariff values for agricultural commodities.

(iii) *Statistical Wing of the Indian Council of Agricultural Research (ICAR).* The Council has a team of expert statisticians in its statistical branch. The functions of the Branch are to :

- (a) advise the Central and State Departments of Agriculture, Animal Husbandry and Veterinary Sciences, on different research schemes sponsored by the ICAR and the planning of agricultural and animal husbandry experiments ;
- (b) scrutinize statistical programmes and progress reports of the research schemes of the Council and papers received for publication in the Council Journal ;

- (c) impart training in statistics relating to agriculture and animal husbandry ;
- (d) carry out fundamental research on the application of statistical methods to agriculture and animal husbandry problems ; and
- (e) carry out sample surveys for the improvement of agricultural, livestock and fisheries statistics.

The Council has been conducting training courses in agricultural statistics since 1932. Since 1945-46, a two-year course has been started for training statisticians in agricultural and animal husbandry statistics.

The Council started crop cutting sample surveys in 1943. Now these have been extended to cover all the principal crops in most of the reporting areas of the Indian Union. Reports on these surveys are regularly published. Sample surveys are also undertaken to assess the effect of G.M.F. campaigns.

In 1952, the Crop Survey Wing of the ICAR was transferred to the National Survey Organization.

The Council has an Institute of Agricultural Research Statistics for

- (a) advising the Department of Agriculture and Animal Husbandry on statistical aspects of different schemes of research sponsored by the Council, (b) training of professional agricultural statisticians and (c) conducting research such as the evolution of random sampling techniques for improving the collection of statistics of area and production and cultivation practices of certain crops, livestock, cost of cultivation, assessing incidence of pests and diseases, fertilizer trials in cultivators' fields, assessment of area under high yielding varieties etc.

(iv) *Statistical Section of the Forest Research Institute.* This section performs the following functions :

- (a) preparation of experimental designs and statistical analysis and interpretation of results for all research branches of the Institute ;
- (b) advice to State silviculturists on experimental designs and assistance to them on a limited scale in the analysis of data ;
- (c) advice to State Forest Departments on sampling techniques for surveys of forest resources ;
- (d) conducting of statistical training courses for forest officers, deputed from States and students of the Indian Forest College ;
- (e) research on designs of experiments and

(f) research on sampling techniques.

(v) *Central Rice Research Institute, Cuttack.* The institute has one statistician, who compiles all data which are presented in *ad hoc* publications.

(vi) *Department of Community Development and Co-operation in the Ministry of Food, Agriculture, Community Development and Co-operation.* Within the Department, there exists an Administrative Intelligence Unit which is charged with the maintenance of progress of various developmental measures *inter-alia* connected with the increase in agricultural production. The Department in association with the State Statistical Bureaus conducts (a) sample surveys for estimating the area benefited by improved agricultural practices, (b) survey of primary agricultural credit co-operative societies. The Department is also taking steps in (a) studies in regard to village and block agricultural production programmes and (b) preparation of block level indices of agricultural production.

The other Statistical units are

(vii) *Statistical units of the Central Marine Fisheries Research Station, Mandampam, and*

(viii) *Statistical Unit of Sugar and Vanaspati.*

The Commodity Committees (now Regional Development Offices) have also Economics and Statistics Units, particularly the Cotton and Jute Development Regional Offices).

Ministry of Irrigation and Power

The Central Water Commission in the Ministry has two statistical sections, one dealing with statistical problems relating to waterways, irrigation and navigation, and the other with the collection of comprehensive data relating to electricity undertakings.

National Sample Survey

The difficulties in the way of expeditious collection of data on a comprehensive basis and the limitations of cost and manpower brought to the fore the sampling approach. The Directorate of National Sample Survey under the Department of Statistics (Cabinet Secretariat) was created to collect statistical data on a random sampling basis in the various sectors of national economy such

as socio-economic surveys. The data which are collected on a random sampling basis cover demographic and socio-economic conditions such as composition of households, pattern of expenditure and income, employment and unemployment, agricultural prices, cost of cultivation, output of livestock products, land utilization, crop cutting experiments, agricultural holdings, livestock number, livestock products, etc.

The surveys are conducted on behalf of the Government of India. The field work, *i.e.*, data collection of the survey and primary scrutiny, is the responsibility of the Directorate of National Sample Survey (NSS), which is an attached office of the Department of Statistics, Government of India, except in West Bengal and Bombay City, where it is the responsibility of the Indian Statistical Institute (ISI). The technical work which includes planning, survey, processing of the data, tabulating the results and preparing the final report, is done by the ISI. A Programme Committee consisting of representatives of various Central Ministries concerned, State Governments, the Central Statistical Organization (CSO), NSS Directorate and ISI, advises the Government of India (Department of Statistics) on the general plan of the survey, the items of information to be collected in each round and the tabulation programme. Most of the States of India have started participating on matching basis with the Central Programme of the NSS.

To ensure rapid processing and systematic analysis of socio-economic data, collected regularly through the National Sample Survey (NSS) it has now been decided to bring all aspects of work relating to NSS under one unified control. It will be entrusted to a single Government organisation located in the Department of Statistics, Cabinet Secretariat. This organisation will be responsible for designing, field work and tabulation.

Reliable and timely data on crop production are of crucial importance for agricultural planning and management of food distribution. The present system of reporting of crop areas and production does not adequately meet the needs of Government for purposes of policy. With a view to improving crop statistics and building advance estimates of area and production, it is proposed to introduce a scheme for timely reporting of crop areas based on a complete plot-to-plot enumeration in respect of sample of villages with proper checks on the complete enumeration work of the primary reporting agency.

The scope of crop surveys in the NSS will be expanded to

provide estimates for all major food and non-food crops through centralised tabulation of data collected by NSS and the States which collaborate in these programmes. These surveys will be integrated with the State crop estimation work so that the NSS sample of villages will form a part of the State sample for the scheme of timely reporting of crop areas. The NSS sample villages for crop cutting will also be included in the State crop yield surveys. These arrangements are expected to provide independent estimates at the national level and improve the reliability of estimates at the State level.

Ministry of Commerce and Industry

Out of seven Statistical units in the Ministry, the following three have some relation with agriculture.

- (i) Statistical Section of the office of the Textile Commissioner, Bombay—1953.
- (ii) Department of Commercial Intelligence and Statistics.
- (iii) Office of the Economic Adviser.

The Statistical Section of the office of the Textile Commissioner collects statistics of production of cotton textile and consumption, and statistics of raw cotton and coal used by cotton factories, textile machinery, etc. and publishes, *Monthly Statistics of Cotton Spinning and Weaving in India*.

The Department of Commercial Intelligence and Statistics is responsible for the compilation and publication of India's internal and foreign trade statistics.

The Office of the Economic Adviser compiles and publishes the weekly index numbers of wholesale prices popularly known as the Economic Adviser's Index or the Official Index.

Ministry of Finance

The Reserve Bank of India has set up a full-fledged Research Department which collects different types of statistics. Special mention may be made of the All-India Rural Credit Survey conducted by the Bank in 1951-52. The All-India survey is followed up by the Rural Credit Follow-up Surveys. The Fourth Follow-up Survey had been conducted in July 1960-June 1961 with 1959-60 as the reference period.

The Division of Rural Economics, like the Economic Department of the Reserve Bank of India of which it is a part, has been so organized as to provide the nucleus of a research counterpart to the operational activities undertaken by the Bank in the field of rural credit. It has, therefore, a sphere of study and work complementary mainly to the Agricultural Credit Department. This Division was set up in August 1945 with a programme of research which embraces "a study of problems relating to the finance for the production, storage and marketing of agricultural output of all kinds, output of cottage industries income from which helped to supplement income from agriculture and of the output of industries closely alike or complementary to agriculture, such as dairy farming." To undertake this programme, it was envisaged at that time that the Division would be studying : (1) the role played by Central Banks in other countries in the development of rural economy, (2) the part played by several financial agencies including the Reserve Bank of India in providing credit to the rural sector, (3) rural indebtedness, (4) agriculture and its terms of trade, (5) problems relating to agricultural marketing and (6) trends in rural incomes including the study of problems relating to farm business, size of holdings, tenure and tenancy, techniques of cultivation, etc. The Division was also expected to conduct periodical surveys which would be "in the nature of economic X-ray photographs, so to speak, of the economy."

Broadly speaking, the development of the activities of the Division has taken place in three stages. The first stage covers the period from the Division's inception in August 1945 up to the initiation of the All-India Rural Credit Survey in 1951. From 1951 to 1955, which marks the second stage of development, the Division was fully occupied with the work relating to the All-India Rural Credit Survey. The third stage of development of the activities in the Division followed the publication of the Report of the Committee of Direction of the All-India Rural Credit Survey which devoted a chapter to the follow-up, publicity, review and research. In pursuance of the recommendations of the Committee, the Division was reorganized, creating two sections, namely, the General Section and the Survey Section in 1955-56. The former deals with problems in agricultural economics and agricultural finance.

Ministry of Labour and Employment

An Agricultural Labour Enquiry Branch was originally created in this Ministry in 1950-51 for maintaining detailed statistical records

emerging out of the proceedings of the Agricultural Labour Enquiry Committee (1950-51). It published a number of *ad hoc* reports in connection with proceedings, witnesses and recommendations of the Enquiry Committee. The unit could not finally wind up its functions of the first enquiry when the appointment of the Second Agricultural Labour Enquiry Committee was announced in 1956. Now this unit is working more or less on a quasi-permanent basis with the Labour Ministry. Since 1955 it is constructing consumer price index number for agricultural labour in India.

Labour Bureau—Ministry of Labour and Employment

The Labour Bureau of the Ministry is responsible for the collection and dissemination of labour statistics and intelligence. It undertakes family budget enquiries and compiles cost of living index numbers. Survey of rural agricultural labour conducted on an *ad hoc* basis is also one of the activities of the Bureau. It also compiles the consumer price index numbers of agricultural labourers on the basis of weighting diagrams obtained with the National Sample Survey of agricultural labourers.

Ministry of Home Affairs

In the Ministry of Home Affairs the most important statistical unit is the office of the "Census Commissioner and Registrar General of India" with its counterparts in the Census Regions. This department maintains detailed records of vital statistics in India and conducts the decennial census of population in the country. The Census Reports are published by the department after each census and the vital statistics are recorded on a permanent basis. Further, it also prepares and maintains the National Register of Citizens at the headquarters of every district in India.

Office of the Registrar General. For the 1961 population census the following categories were included for agriculture in the classification adopted for the working population :

- (i) cultivation ;
- (ii) agricultural labour ;
- (iii) mining, quarrying, livestock, forestry, fishing, hunting, plantation, orchards and allied activities.

One of the salient features of the 1961 census has been to

supplement the data collected by information on the economic activities of the household as an entity. This information has been collected through the household schedule which provided for data on the chief economic activities of the household, *viz.*, cultivation and household industry. Information has also been collected in respect of family workers and hired workers.

The appointment of the Registrar General was made for each census before 1961. This created a big lacuna in a period of development. Requirements of planning need annual forecasts of population. This is possible only if the appointment is made permanent and some sort of a sample survey is also conducted annually. It has now been decided that the office as well as the post of the Registrar General will continue throughout in interperiod. The work of population projections, vital registration and sample census will continue during this period.

Beginning with 1881, the Census has since been taken once every ten years. The census operation is of immense magnitude carried out with the help of about 6 million honorary enumerators including government employees, employees of local bodies and teachers. Plans have been worked out by the Registrar General and Census Commissioner for evolving an integrated system of demographic and vital statistics on a continuing basis and these are under implementation.

The decennial census of population is an important source of demographic and economic data. Several improvements have been introduced in the programme of the 1971 census. These include a special schedule to list characteristics of manufacturing, trading and other establishments; additional questions on age at marriage and children born during the last year to provide data on current fertility; additional questions on place of last residence and duration of residence to improve the quality of information on internal migration; and some change relating to the classification of population into workers and non-workers designed to reflect better the employment status of the population. The census programme also provides for expeditious tabulation and publication of data. An important feature of the programme is the preparation of detailed notional maps of every village and every town indicating the location of every house, together with comprehensive house lists. These are expected to serve as a good frame for any future sample survey.

Statistical Organizations in the States

Statistical Organizations in the States like those in the Government of India are also generally of a decentralized type. Different Departments in the States collect, maintain and issue statistics relating to their respective subjects. Some of the States have already set up statistical units in the Departments of Agriculture or Land Records while in a few the Statistical Bureaus¹ are in charge of agricultural statistics. The State Statistical Bureaus are responsible for effecting co-ordination in statistical matters between the different Governments of their respective States to provide technical guidance to these departments and to recommend improved methods for the collection of primary statistics by them.

Non-Governmental Organizations

Besides the official agencies, a number of semi-official and private organizations exist and have contributed to the progress of agricultural statistics in India. Some of them worth mentioning are :

1. The Indian Statistical Institute, Calcutta.
2. National Council of Applied Economic Research, New Delhi.
3. Indian Society of Agricultural Economics, Bombay.
4. Indian Institute of Management, Ahmedabad.
5. Universities and educational institutions.

1. A list of the State Statistical Bureaus along with their addresses is given in Appendix 2, and State authorities responsible in the supply of crop forecasts in Appendix 3.

3

Land Utilisation Statistics

LAND UTILISATION Statistics provide the area figures showing distribution of the total geographical area of a country into its various uses. Such statistics for India are being published since 1884 in the *Agricultural Statistics of India*, Vols. I and II. Before Independence, the Reporting area for land utilization statistics from the total geographical area of India was classified into the following five broad heads according to its utilization :

1. Area under forests.
2. Area not available for cultivation.
3. Uncultivated land excluding current fallows.
4. Area under current fallows.
5. Net area sown.

To get a better picture of the potentialities for land development for cultivation as well as non-agricultural uses, this classification was revised in 1949-50. Standard definitions of the various classes were evolved to be followed by all the states. Prior to it, definitions of land classes among the different States were not uniform. The available data were, strictly speaking, non-comparable. There used to be a considerable time lag in their publication. The time lag has now been reduced from five to three years. Table 3 gives a comparative picture of the past and present classifications and Table 4 important changes in the land utilisation Statistics during the first three Plan periods.

TABLE 3
OLD AND NEW LAND UTILIZATION CLASSIFICATION

<i>Old classification</i>	<i>New classification</i>
1. Forests	1. Forests
2. Area not available for cultivation.	2. Land not available for cultivation. (i) Land put to non-agricultural uses. (ii) Barren and unculturable land.
3. Other uncultivated land excluding current fallows.	3. (i) Permanent pastures and other grazing lands. (ii) Miscellaneous tree crops and groves not included in the net area sown. (iii) Culturable wastes.
4. Current fallows	4. (i) Fallow land other than current fallows. (ii) Current fallows.
5. Net area sown	5. Net area sown.

1. *Geographical Area.* The latest figure of geographical area for the State/Union Territory/a District as furnished by the Central Statistical Organization based on the Surveyor General of India's data is used.

2. *Reporting area for land utilization purposes.* The Reporting area stands for the area for which data on land use classification are available. Where land utilization figures are based on land records, reporting area is the one according to village papers, i.e., the papers prepared by the village accountant. In some cases the village papers may not be maintained in respect of the entire area of the State. For example, such papers are not prepared for the forest area but the magnitude of such area is known; also there are tracts in many States for which no village papers exist but for which *ad hoc* estimates of classification of area etc. are framed to complete the coverage. In such cases, this gives the summation of the area for which village papers actually exist and the area for which *ad hoc* estimates are available.

Forests. Area under 'Forests' includes all actually forested areas or lands classed or administered as forests under any legal enactment

TABLE 4
LAND UTILIZATION STATISTICS—ALL-INDIA
(1950-51 to 1966-67)

Particulars	1950-51	1955-56	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66*	1966-67
	(Million hectares)								
Geographical area	326.8	326.8	326.8	326.8	326.8	326.8	326.8	326.8	326.8
Reporting Area for land utilization									
(i) Forests	294.3	291.9	298.4	299.2	305.0	305.2	305.3	305.3	305.6
(ii) Not available for cultivation	49.6	51.3	54.1	54.2	60.5	60.7	60.4	60.3	62.3
(iii) Other uncultivated land excluding fallow lands	47.5	48.4	50.7	50.7	50.3	50.1	50.2	50.3	48.3
(iv) Culturable waste	22.9	21.5	19.2	18.6	17.9	17.6	17.4	17.2	17.1
(v) Permanent Pastures and other Grazing Lands	6.7	11.5	14.0	14.1	14.1	14.6	14.7	14.9	14.1
(vi) Land under Miscellaneous three crops and Groves (not included in net area sown)	19.8	5.9	4.4	4.5	4.6	4.4	4.1	4.1	4.1
Total	49.4	38.9	37.6	37.2	36.6	36.6	36.2	36.2	35.3
(iv) Fallow Lands	28.1	24.1	22.8	21.6	21.3	21.3	20.4	22.4	22.6
(v) Net Area sown	116.7	129.2	133.2	135.4	136.3	136.6	135.1	136.2	137.0
III. Sown Area									
(i) Gross sown area	131.9	147.3	152.8	156.2	166.8	167.0	159.2	165.3	166.6
(ii) Net sown area	118.7	129.2	133.2	135.4	136.3	136.6	135.1	136.2	137.0
(iii) Area sown more than once (i)-(ii)	13.2	18.1	19.6	20.8	20.6	20.5	21.1	19.1	19.6

*Provisional.

dealing with forests whether state owned or private. If any portion of such land is not actually wooded but put to some agricultural use, that portion is included under the appropriate head of cultivated or uncultivated land.

The figures of area under forests are collected by the Forest Departments in the States and published in Indian Forest Statistics. The two sets of figures have a discrepancy of 14.1 million hectares because :

- (i) Certain lands not covered by forests but worked by Forest Departments, are counted as forests by the Forest Departments and included in the area under forests, while the same are not treated as forests by the Revenue or Agriculture Departments and are put under any of the heads such as "other uncultivated land excluding fallow lands," if they are covered with shrubs, bamboos, or other grasses, and under "net area sown" if they are cultivated.
- (ii) The forest areas deemed to be "unprofitable" and some of the areas administered as forests by corporate bodies or private individuals are sometimes classified by some States as "area not available for cultivation" or "other uncultivated land excluding fallow lands."
- (iii) Difference in coverage both in respect of period and area.
- (iv) Difference in the methods followed by the two Departments in the enumeration of forest areas.

Table 5 gives a comparative statement of changes in the areas under forests according to the two sources of information during the last 15 years.

TABLE 5
FOREST AREA ACCORDING TO DIFFERENT SOURCES

'000' hectares

<i>Year</i>	<i>Forest statistics</i>	<i>Agricultural statistics</i>
1950-51	71,803	40,482
1955-56	70,366	51,343
1960-61	68,955	58,769
1961-62	75,038	54,54
1962-63	74,425	60,843
1963-64	74,730	60,997
1964-65	75,298	61,170

4. *Areas not available for cultivation* (a) Land put to non-agricultural uses : This stands for all lands occupied by buildings, industrial undertakings, roads and railways or under water, e.g., rivers, and canals and all other lands put to any other non-agricultural uses.

(b) Barren and uncultivable land : This covers all barren and uncultivable lands like mountains, deserts, etc. Lands which cannot be brought under cultivation without incurring costs on their development are classed as unculturable, such land could be outside or within cultivated holdings.

In Rajasthan, lands classified under this head lie mostly in the Thar desert, where the soil is sandy and rainfall is below 20 inches. In other States, they are generally in districts where the topography is hilly or is covered with laterites or such soils as are highly infertile, stony and coarse, and the rainfall is insufficient so that it is hardly possible to develop or cultivate these lands at a reasonable cost.

5. *Other uncultivated land excluding current fallows.* (a) Permanent pastures and other grazing lands : These cover all grazing lands, whether they are permanent pastures and meadows or not. The common land in the village and grazing lands within the forest areas are included under this head.

(b) Miscellaneous tree crops and groves not included in the net area sown : All the culturable land put to some agricultural use but not included under 'net area sown' is included under this class. Lands under thatching grasses, bamboo bushes and other groves trees, for fuel, etc. which are not included under orchards are placed in this category.

(c) Culturable Waste : These include lands available for cultivation whether or not taken up for cultivation or abandoned after a few years for one reason or the other. Such lands may be either fallow or covered with shrubs and jungles which are not put to any use. They may be assessed or unassessed and may be in isolated blocks or within cultivated holdings. Land once cultivated but not cultivated for five years in succession is included in this category. It is a sort of residual class which includes all uncultivated lands not accounted for by any other class.

It is a misnomer to assume that all the 17·36 million hectares of land under this head is available for cultivation as the definition of the

term will suggest. A Waste Land Survey Committee went into this matter in 1959 and studied the position for 7 important States. Land available for cultivation in holdings over 100 hectares was estimated by them as 450 thousand hectares. Another survey for locating waste lands in smaller blocks was taken up during the Third Plan. An additional area of 2.2 million hectares has been located which will be available for cultivation.

6. *Fallow Lands.* (a) Fallow land other than current fallows : This includes all lands which were taken up for cultivation but are temporarily out of cultivation for a period of not less than one year and not more than five years. The reasons for keeping such lands fallow may be one of the following :

- (i) Inability of farmers to cultivate for lack of means.
- (ii) Inadequate water supply.
- (iii) Malarial climate.
- (iv) Silting of canals and rivers.
- (v) Unremunerative nature of farming.

(b) Current fallow : This class comprises cropped areas which are kept fallow during the current year. For example, if any planted area in one season is not cropped again in the same year it is treated as current fallow.

There is, however, a close relationship between the 'fallow lands' and the 'net area sown' since there are frequent shift-overs from one to the other. Good and timely rainfall, weather conditions, prices, political stability, security of tenure and tenancy conditions help in increasing the area sown.

7. *Net area sown.* It represents the actual physical area under crops and orchards. Areas cropped more than once are counted only once.

Weaknesses of the Land Utilization statistics

Detailed statistics of land use which mainly give area of land put to different agricultural uses are available almost continuously from 1887-88, although coverage of these statistics has been changing from time to time and their scope gradually expanding.

Present coverage of land use and crop statistics is about 94 per cent¹ of the total area of the country, i.e., 77 per cent covered by complete enumeration, 5 per cent by sample surveys and another 12 per cent by conventional estimates. Since the remaining non-reporting area of 6 per cent is mainly covered by hills and forests and there is very little cultivation on it, the present position of land use in the country could be considered as quite satisfactory although there is still scope for improvement.

According to "Wastelands Survey and Reclamation Committee," although the classification suggested by the Ministry of Food and Agriculture had been adopted in all the States, the concept of the term "Uncultivated lands excluding fallow lands" is not yet clearly understood. Lands which were classified as 'culturable waste' at the time of settlement, same areas are still continued to be shown as such in the Revenue Records even though they cannot be made culturable after incurring any reasonable expenditure. Similarly, some of the lands which are culturable, continue to be classified as barren and unculturable or pasture lands. In some other cases, pasture lands have been included in the category of culturable waste.²

In view of these considerations, the Committee expressed the view that the areas included in the two categories, viz., "other uncultivated lands excluding fallow land" and "fallow lands other than current fallows" may not fairly represent the actual extent of culturable wastelands in the country, and accordingly much reliance could not be placed on the statistics supplied by the State Government.³

The non-comparability of concepts and definitions creates a difficulty in the way of determining the land utilization trends over a period of time. Besides the changing definitions, another great difficulty in examining the trends for various land utilization categories is the fact that the increase under any category may be solely or partly due to an increase in the reporting area.

The area statistics figures generally relate to the agricultural

1. This was 69 per cent before the First Five Year Plan.

2. (i) Report on Location and Utilization of Wastelands in India, Part VI, Madhya Pradesh, p. (iii),

(ii) "Indian Agricultural Statistics, A Critical Review" *Agricultural Situation in India*, Annual Number, August, 1960, p. 531.

3. *Ibid.*, p. (iii).

year ending 30th June, but in the case of Assam and Madhya Pradesh, they relate to the years ending 31st March and 31st May, respectively. Land utilization statistics for West Bengal are still collected under the old classification. The classification adopted for reporting the land utilization statistics of the State is not, therefore, as elaborate as in other States. A comparison of the data in this state with the other states is untenable. Precision for the total area under these sub-heads thus is lost.

Over-time non-comparability is augmented by the fact that prior to 1919-20, some of the former Provinces adopted the financial year, while others followed the agricultural year; for the former Princely States, the year to which the figures relate differed from State to State.

Forest Statistics

FOREST STATISTICS are initially compiled by the State Forest Departments and issued as annexures to their annual administration reports. The forms in which the data are collected are not fully in conformity with the proformae used by the FAO for collection and dissemination of forest statistics for the world as a whole.

Indian Forest Statistics

At the Centre, the Directorate of Economics and Statistics, Ministry of Food & Agriculture, co-ordinates and compiles the data on forest statistics, on the basis of annual returns received from State Forest Departments. The principal forest statistics of area under forests, out-turn of timber and other forest produce, employment in forests and forest industries, revenue and expenditure and foreign trade of forest products etc. are published annually in the *Indian Forest Statistics* issued by the Directorate of Economics and Statistics and relates to the financial year ending 31st March. Upto 1946-47, data on forestry were issued through the annual returns of statistics relating to 'Forest Administration in India'. The scope of the publication was restricted to only state-owned forests in British India. No information was made available about the private forests in British India and those in the princely states.

From 1947-48, the scope of this publication has been widened and the following information which was not included in the annual returns during the pre-independence period, has been included :

1. Classification of forest area according to type of wood.
2. Volume of standing timber and fire-wood and their increments in exploitable forests.
3. Employment of labour in forestry and forest industries.
4. Out-turn of logs, sleepers, etc.
5. Out-turn of timber and firewood species-wise.
6. Out-turn of minor forest produce—quantity and value.
7. Foreign trade in forest produce.

Upto 1951-52, forests and forest product statistics used to be published in one volume. The issues for the subsequent three years were published in two volumes, Vol. I giving only all-India figures and Vol. II state-wise details. From the year 1955-56 again, the publication is being brought out in one volume and gives all-India data for 10 years and state-wise data for two years instead of 5 years as given in the previous publications. State-wise estimates of major forest produce as available in the above publication relate to the areas managed by the State Forest Departments, but do not cover forest areas under ownership rights of corporate bodies, civil authorities or private individuals. To that extent figures are incomplete.

Changes After 1958-59

Besides the extension of coverage of forest statistics, certain improvements have been brought about in the proforma for collection of forest statistics from the year 1958-59. In addition to the amplification of the existing tables, the following new tables have been added for collection of information regarding :

- (i) Area afforested and deforested during the year.
- (ii) Classification of forests according to use, management status, silvicultural system and density.
- (iii) Quantity and value of manufacture of forest produce, *e.g.*, plywood, pulp matches, etc.
- (iv) Annual consumption and carry over of major and minor forest produce according to different categories of produce.
- (v) Wholesale prices of major and minor forest produce at important centres.
- (vi) Games shot.
- (vii) Seasoning kilns and treatment plants.

Alongwith the amplification of the information as already mentioned, a revised set of proformae for the reporting of forest statistics has been finalized by the Directorate of Economics and Statistics in consultation with the State Forest Departments. A common definition for the term 'forest' has been adopted. All unwooded or other areas put to some agricultural or non-forest use would be left out from 'forest' areas and indicated separately. This would bring about a greater agreement in the figures reported in the 'Indian Forest Statistics' and 'Agricultural Statistics.' The following additional information is also made available according to the revised proforma from the year 1958-59.

1. Area of forests surveyed with topographical details.
2. Out-turn of logs, sleepers etc.
3. Species-wise outturn of timber and fuel wood, and
4. Outturn and volume of minor produce.

Forest statistics are compiled by the State Forest Department. Censuses of industries and agriculture also include items on forests which are generally dealt with by the Industries and Revenue Departments of the States respectively. No separate statistical organization exists except in the case of a few States. Serious drawback in the publication *Indian Forest Statistics* is that, there is a time lag of about 4 years in publishing the data. Even the data in unpublished form available with the Chief Conservator of Forests and the State Statistical Bureaus are far from upto date although in this case the time lag is little less, i.e., about 2 years. Statewise forest area for 1966-67 are shown in Table 6 and India in the world forestry in Table 7. Percentage distribution of forest resources in the world is given in Table 8.

Indian Agricultural Statistics

Apart from the *Indian Forest Statistics*, another publication of the same Ministry also publishes estimates on area under forest in Vols. I, and II of *Indian Agricultural Statistics*. These are based on Agricultural Statistics collected by the revenue agencies and relate to the year July to June. But the two sets of figures generally do not tally. The differences generally arise mainly from the differences in the geographical coverage, diversity of purposes for which the statistics are compiled by the two agencies and the difference in the reference period.

A revised definition of forest area recommended by the Standing Committee on Improvement of Agricultural Statistics has been accept-

TABLE 6
STATEWISE GEOGRAPHICAL AREA AND FOREST AREA—1966-67

State/Union Territory	Geographical area (As on 1.1.66)	Forest area	Percentage of forest area to geographical area	Exploitable area		Potentially Other forest area	Population in million forest area (Mid-Year 1967)	Per capita forest area
				Coniferous	Non-coniferous			
I. State								
Andhra Pradesh	27,524	6,651	24.2	...	5,082	1,569	...	40.7
Assam	12,197	4,565	37.4	2	4,513	32	18	14.3
Bihar	17,401	3,085	17.7	...	2,133	932	...	53.8
Gujarat	18,709	1,940	10.4	...	1,847	...	93	24.5
Haryana	4,380	136	3.1	1	93	...	42	9.2
Jammu & Kashmir	22,287	2,081	9.3	592	1,184	305	...	3.9
Kerala	3,887	1,041	26.8	...	727	232	62	19.8
Madhya Pradesh	44,346	17,299	39.0	...	14,411	2,888	...	37.8
Madras (Tamil Nadu)	12,997	2,218	17.1	...	1,423	795	...	37.5
Maharashtra	30,727	6,686	21.8	...	3,829	2,461	396	46.4
Mysore	19,176	3,620	18.4	...	2,615	905	...	27.3
Nagaland	1,649	310	18.8	...	137	160	23	0.4
Orissa	15,586	6,816	43.7	...	5,683	1,112	21	20.2

Punjab	5,080	188	3.7	13	147	...	28	13.5	0.01
Rajasthan	34,227	3,764	11.0	...	3,764	...	...	24.2	0.16
Uttar Pradesh	29,436	4,571	15.5	700	2,451	701	719	84.9	0.05
West Bengal	8,767	1,183	13.5	9	1,119	22	33	41.4	0.03
II. Union Territory									
A. & N. Islands	829	635	76.6	...	533	29	73	0.1	0.64
Delhi	148	• 5	3.4	...	3	...	2	3.6	Neg.
Goa, Daman & Diu	373	103	27.6	...	93	10	...	0.7	0.14
Himachal Pradesh	5,600	2,165	38.7	606	910	404	155	3.4	0.64
Manipur	2,235	602	26.9	...	291	311	...	1.0	0.60
N. E. F. Agency	8,143	5,154	63.3	...	4,862	292	...	0.4	12.89
Tripura	1,045	633	60.6	...	221	190	222	1.5	0.42
All India	326,809*	75,351	23.1	1,923	58,071	13,470	1,897	511.1	0.15

Neg—Negligible.

*Includes information in respect of the Union Territories of Chandigarh, Pondicherry and Karaikal, Laccadive, Minicoy and Amindive Islands, Dadra and Nagar Haveli.

Note :— Figures are provisional and subject to revision.

TABLE 7
WORLD FOREST STATISTICS 1966

<i>Region</i>	<i>Land area million hectares*</i>	<i>Forest area million hectares</i>	<i>Forest area %</i>	<i>Population in million</i>	<i>Per capita forest area</i>
Europe	493.0	138.0	27.9	445	0.31
U.S.S.R.	2240.2	910.0	40.6	231	3.93
North America	1971.0	745.4	37.8	214	3.48
Central America	274.0	75.6	27.6	80	0.95
South America	1783.1	940.0	52.7	166	5.66
Asia	2783.1	519.6	18.6	1895	0.27
Africa	3026.0	604.0	20.0	311	1.94
Pacific	852.0	82.0	9.6	17	4.82
Total World	13+22.3	4014.6	30.0	3359	1.19
INDIA	326.8	75.3	23.1	499	0.15

PERCENTAGE DISTRIBUTION OF FOREST RESOURCES

<i>Region</i>	<i>Forest area</i>	<i>Growing stock†</i>	<i>Removals of industrial wood</i>	<i>Removals of fuel wood</i>
Europe	3.4	3.6	21.8	11.4
U.S.S.R.	22.7	23.7	25.2	11.5
North America	18.5	18.0	31.1	5.2
Central America	1.9	0.4	0.7	4.1
South America	23.5	33.0	2.5	17.6
Asia	12.9	10.1	11.9	29.4
Africa	15.0	9.0	2.2	19.8
Pacific	2.1	2.2	1.6	1.0
World	100.0	100.0	100.0	100.0

*Relates to total area including area under inland water bodies.

†Relates to the year 1963.

ed for adoption in the Indian Forest Statistics and Indian Agricultural Statistics.

Planning and Statistical Cells

Considering this, a scheme for the establishment of Planning and Statistical Cells in the State Forest Departments has been included in the Fourth Five Year Plan. Many of the States have already set up statistical cells and others are in the process of doing so. A Forestry

Statistical Cell has also been set up at the Centre under the Inspector General of Forests which will enable a compilation of data collected by the Chief Conservator of Forests within a reasonable period. In close collaboration with the Dte. of E & S, it is hoped that the *Indian Forest Statistics* can be published without serious time lag in the near future. The Forestry Statistical Cell has been issuing a Bulletin—Forest Statistics. The object of their Bulletins is to provide a handy reference of latest data on forestry for use of the large body of forestry personnel. They are of considerable assistance towards evolving uniform proformae for collection of forest statistics by the State Forest Departments. So far such Bulletins have been issued and they contain a mass of data on various aspects of forestry, in India and other important countries of the world. Some important ones out of them cover :

- (i) Forest Statistics Bulletins in respect of area under forests by categories, out-turn of timber and fuelwood, revenue and expenditure, imports for the year 1964-65.
- (ii) A comprehensive Bulletin giving achievements during the three five year forestry development plans.

Other Publications

Some other useful publications on Forest Statistics are as under :

1. India's Forests and the War.
2. Forestry in India, 1953-54.
3. Hundred Years of Indian Forestry, 1861-1961.
4. FAO/ECAFE Timber Trend Study for the Far East—Country report for India—1958.
5. Integration of Forests and Industries—J.A. Von Monrov Report.

The first two of these publications were brought out by the Directorate of Economics and Statistics and presented most of the then available data at one place. The Second Publication, for example, was published at the time of the Fourth World Forestry Conference, 1954 and presented important facts and statistics relating to forestry. The third was issued on the occasion of the Celebration of Indian Forest Centenary by Forest Research Institute and Colleges, Dehradun. The Timber Trend Study Report, besides reproducing the data on area

and out-turn of forest produce from the Indian Forest Statistics, supplies the following additional information :

1. Methods of logging operation and waste and losses incurred during logging.
2. Production costs at different stages of forest exploitation such as stumpage prices, felling costs, transport charges from stump to permanent lines of transport and transport charges along these permanent lines.
3. Supply and consumption of round wood, fuel wood and charcoal, bamboo and palm species.
4. State-wise movement of round wood and future supply of indigenous raw sources, etc.

This study, published in 1958 by the Ministry of Food and Agriculture gives for the first time a fair appraisal of the future requirements of roundwood and its products by end-uses in a detailed form. The Monrov Report which was completed in 1960 deals at length with the following points :

1. Characteristics of forests and forest industries.
2. Analysis of requirements and supply of forest produce—building material, mining, transport and communication, woodworking industries, packaging, paper, rayon, and matches.
3. Present and potential requirements of industrial wood—fuel wood, tanning material, lac, rosin and terpentine, medicinal plants and essential oils.
4. Future lines of development, giving a tentative list of selected integrated and semi-integrated industries.

Valuable information is also contained in the following publications which deal comprehensively with different aspects of Indian Forestry :

- (i) Timber Trends and Prospects in India—1960-1975 (Prepared for the VII Session of "Asia Pacific Forestry Commission—1962" by Forest Research Institute and Colleges, Dehradun).
- (ii) Fuelwood Plantations in India, FAO December, 1958.
- (iii) Progress Report of India, 1960-65 (Prepared for the IXth Commonwealth Forestry Conference, January, 1968).
- (iv) Forestry in India—1967.

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Area Statistics

COVERAGE STATISTICS of the distribution of gross cropped area by crops are published in the *Agricultural Statistics of India*, Vols. I and II. They are based on the information contained in the *Season and Crop Reports* issued annually by the State Governments. For quite a long time, area statistics by crops were available for a limited number of crops and were collected and reported for most of the British Provinces and a few of the Indian States. Before Independence, the coverage of crop forecasts was not only incomplete, but it also differed from crop to crop. The forecasts covered only those States where the crop was grown to an appreciable extent and where facilities for reporting were available. Conventional estimates of acreage and production of these crops in respect of non-reporting areas were developed in the interest of complete coverage for the country. The coverage of food crops is complete from the year 1948-49 ; conventional estimates are still prepared for those areas where no regular returns exist. The geographical coverage of commercial crops is now much larger than before and is fairly complete in respect of important ones.

The classification earlier adopted for area under different types of crops was not detailed and accurate enough for the purpose of food and agricultural administration. On the recommendations of the Inter-Departmental Committee on Agricultural Statistics, the scope of the classification was extended. Detailed figures are now available in respect of *kharif* and *rabi* cereals and pulses separately. The category

'pulses' has been split up into gram, *tur* or *arhar*, and other *kharif* and *rabi* pulses.

Statistics of irrigated area under these crops are also available now. The scope of the group of crops known as condiments and spices has also been enlarged. The general head 'oilseeds' has been split up into edible and non-edibles; sesamum, rape and mustard, coconut and ground-nut being considered as edible and linseed as well as castor being treated as non-edible. The classification of crops is fairly detailed and separate figures are now published in respect of the following groups and sub-groups.

TABLE 9
CLASSIFICATION OF CROPS FOR WHICH AREA STATISTICS
AREA RELEASED

I. Food Crops	
(a) Foodgrains	
(i) Cereals	Rice—autumn, winter, summer and total, cholam or jowar—kharif, rabi and total, cumbu or bajra, maize, ragi or marua, wheat, barley, other cereals and small millets kharif, rabi and total, total cereals and millets.
(ii) Pulses	Gram, tur or arhar, other pulses—kharif, rabi and total, total pulses.
Total foodgrains.	
(b) Sugar, sugarcane, others, total.	
(c) Condiments and spices	Pepper (black), chillies, ginger, turmeric, cardamoms, betelnuts, others, total.
(d) Fruits and vegetables including	Fruits—dried—cashewnuts, others. Fresh—mangoes, citrus fruits, bananas, grapes, others.
Root Crops	Vegetables—potatoes, tapioca, sweet potatoes, onions. Others—kharif and rabi.
Total fruits and vegetables.	
(e) Other food crops	
Total food crops.	
II. Non-food crops	
(a) Oilseeds	Groundnut, castor, sesamum (til or jinjili), rape and mustard, linseed, coconut, others, total.
(b) Fibres	Cotton, jute, mesta, sannhemp, others, total.
(c) Dyes and Tanning Materials	Indigo, others, total.

- | | |
|----------------------------|---|
| (d) Drugs and
Narcotics | Opium, coffee, tea, tobacco, cinchona, Indian hemp,
others, total. |
| (e) Fodder crops. | |
| (f) Green Manure crops. | |
| (g) Other non-food crops. | |
| | Total non-food crops. |
-

Forecasts

Acreage figures for a current year are periodically made available through forecasts. Normally two to three forecasts are issued for each crop, and in the case of certain crops like cotton, even five forecasts are issued. The first, which is released a month after sowing, gives a tentative idea of the area sown and of the germination conditions. The second estimate issued two months later supplies the estimate of area brought up to date, and also the condition of the crop. These preliminary estimates (both first and second) are based on eye-estimation reports only. The final estimate which gives an accurate picture of the area and production is based on field-to-field inspection made by the patwari (village accountant). Some revisions are made in the final forecast figure later, on the basis of the "Season and Crop Reports" issued by the States. Numbers of forecasts issued and their timings for each crop are shown in Table 10.

The available data are, however, not of uniform standard of accuracy and reliability as methods of their collection in the various States vary at present. This is mainly due to the differences in the administrative and land revenue systems prevalent in the country. Broadly speaking, the whole country can be divided into two parts based on the system of land revenue settlement, namely the temporarily settled areas and the permanently settled areas. The position in respect of each of the above two parts, is discussed below :

Temporarily settled areas. In the case of temporarily settled areas the entire system of land revenue assessment is revised at fixed intervals. Land revenue is collected by Government directly from the land-holder or the cultivator. A vast organization of patwaris (village accountants), Kanungoes (Circle Inspectors) and revenue officers exists for the purpose of land administration, i.e., for the assessment and realization of land revenue and the maintenance of compulsory system of land registration in these areas. The assessment of land revenue is based on land use, the crops grown in each season, etc. and this necessitates a continuous

TABLE 10
DUE DATES OF RECEIPT OF STATE RETURNS AND ISSUE OF ALL-INDIA CROP ESTIMATES

<i>Crop</i>	<i>Estimate</i>	<i>Due date of receipt of returns from States</i>	<i>Due date of issue of All-India Estimate</i>
<i>Foodgrains</i>			
1. Rice	First	October, 15	October, 20
	Second	December, 15	December, 20
	Final	February, 15	February, 20
2. Jowar	First	October, 31	November, 21
	Second	January, 31	February, 21
	Final	March, 31	April, 21
3. Bajra	First	October, 31	November, 21
	Final	February, 28	March, 21
4. Maize	First	October, 31	November, 21
	Final	February, 28	March, 21
5. Ragi	First	October, 31	November, 15
	Final	February, 28	March, 15
6. Small millets	First	November, 5	November, 15
	Second	February, 5	February, 15
	Final	May, 20	May, 30
7. Wheat	First	January, 15	January, 20
	Second	March, 15	March, 20
	Final	May, 25	May, 30

LONG DATE OF RECEIPT OF RETURNS FROM STATES

ESTIMATE

ESTIMATE

CROP

8. Barley	First Second Final	January, 15 March, 15 May, 15	January, 30 March, 30 May, 30
9. Gram	First Second Final	January, 15 March, 15 May, 15	January, 30 March, 30 May, 30
10. Tur	First Second Final	September, 15 January, 15 May, 15	September, 25 January, 25 May, 25
11. Other Kharif Pulses	First Final	September, 15 January, 15	September, 25 January, 25
12. Other Rabi Pulses	First Final	January, 15 May, 15	January, 25 May, 25
13. Groundnut	First Second Final	August, 15 November, 10 February, 10	August, 20 November, 15 February, 15
14. Castorseed	Final	April, 30	May, 10
15. Sesamum	First Second Third Final	August, 15 October, 15 January, 1 April, 15	September, 1 October, 20 January, 15 April, 20

(Contd.)

<i>Crop</i>	<i>Estimate</i>	<i>Due date of receipt of returns from States</i>	<i>Due date of issue of All-India Estimate</i>
16. Rapeseed & Mustard	First Second Final	December, 20 March, 1 May, 15	January, *1 March, 15 June, 1
17. Linseed	First Second Final	December, 20 March, 1 May, 15	January, 1 March, 15 June, 1
18. Nigerseed	Final	February, 28	March, 15
19. Safflower	Final	May, 15	May, 30
20. Coconut	Final	September, 5	September, 15
		<i>Fibres</i>	
21. Cotton	First Second Third Fourth Final	August, 10 October, 10 December, 10 February, 10 May, 5	August, 15 October, 15 December, 15 February, 15 May, 10
22. Jute	First Final	July, 31 October, 20	August, 15 November, 7
23. Mesta	First Second Final	July, 31 October, 20 March, 7	August, 15 November, 7 March, 15
24. Sann-hemp	First Final	August, 15 January, 15	August, 20 January, 20

<i>Crop</i>	<i>Estimate</i>	<i>Due date of receipt of returns from States</i>	<i>Due date of issue of All-India Estimate</i>
<i>Miscellaneous Crops</i>			
25. Sugarcane	First Second Final	June, 21 October, 21 May, 15	July, 1 October, 31 May, 25
26. Tobacco	First Second Third Final	January, 15 March, 20 May, 20 August, 10	January, 25 April, 1 May, 31 August, 20
27. Potato	First Final	January, 31 June, 15	February, 5 June, 20
28. Pepper (Black)	Final	March, 26	April, 5
29. Chillies (Dry)	Final	April, 25	May, 5
30. Ginger (Dry)	Final	March, 5	March, 15
31. Arceanut	Final	September, 5	September, 15
32. Turmeric	Final	June, 15	June, 30
33. Banana	Final	September, 15	September, 25
34. Guarseed	Final	January, 15	February, 1

detailed record of crops, etc. For every village or group of villages there is a Patwari, who collects the primary data on the basis of field to field inspection at periodic intervals. After each crop inspection, the patwari is required to submit consolidated statements showing the areas under different crops, etc. in each season to the circle inspector on the prescribed forms. The circle inspector, in charge of each revenue circle consisting of about 100 villages, controls and supervises the work of patwaris. The work of collection and compilation of agricultural statistics is supervised and controlled at successive stages by the *tehsil* and district officers of the Revenue Department. Estimates of area under crops are thus compiled on the basis of complete field to field enumeration by the primary reporting agencies in all the States except West Bengal, Orissa and Kerala where such elaborate agencies do not exist.

Temporarily settled areas are mostly surveyed cadastrally except for some minor portions for which the maps do not indicate boundaries separating two fields. The absence of such demarcations renders exact reporting by the Patwaris difficult and, therefore, area statistics of such tracts are of an approximate character.

Permanently settled areas. In the permanently settled areas land revenue has been fixed permanently. These areas mainly consist of large estates of *jagirs*. Land revenue, which is fixed in perpetuity, is paid to Government by the estate holders, called *jagirdars*. As this system of land settlement and revenue collection did not require the maintenance of area and crop statistics for each farmer, there used to be no elaborate agency for the collection of these statistics and there were no revenue officers in the villages. In the absence of the patwari agency, the work of primary collection of agricultural statistics in these areas is generally entrusted to the village *chowkidars* who belong to the Police Department, are not trained in crop reporting and are generally illiterate. There is also no adequate supervision over the work of the primary agency for the collection of statistics. The estimates are framed by ascertaining the relation which the area under a crop in each season bears to the normal acreage under that crop during the settlement year. These estimates are generally based on the personal knowledge of the *tehsildars* and the reports of the village *chowkidars*. The estimates framed by the *tehsildars* are again modified by the district officers on the basis of their personal knowledge. The State Government has the final estimates of area on the basis of the figures supplied by the District Officers.

In the absence of an elaborate reporting agency in the permanently settled areas agricultural statistics are not perfect either in availability or reliability. During the past few years steps have been taken to improve the quality of these statistics through the adoption of the method of random sampling surveys and by extending the coverage under complete enumeration. In the States of Kerala, Orissa and West Bengal area statistics are based on sample surveys only. Efforts are being made to institute the system of complete area enumeration in these states also. Available data on the distribution of irrigated and total area under various crops is shown in Table 11.

Reliability of Acreage Statistics Collected by the Primary Reporting Agency :

In the temporarily settled areas, where as already stated, the statistics of acreage are collected as part of land records by the patwaris, the method of collection is one of field enumeration of the entire area under the jurisdiction of the patwari, twice or thrice a year. Though this method of complete enumeration was sound in principle, it could not always be claimed to be so in practice owing to defects in the primary reporting agencies. Serious doubts had in fact been entertained in certain quarters regarding the reliability of acreage statistics provided by patwaris owing to the tendency on their part to neglect making a rigorous personal inspection of the fields and to rely for their information on the reports received from villagers. As the supervision exercised on patwaris' records by superior officers was not sufficiently comprehensive, the data were considered all the more doubtful. The experience of the Indian Council of Agricultural Research, which had been conducting crop-cutting surveys on crops, however, showed that these statistics were not in any way substantially inaccurate.

A good deal of evidence has, in fact, been collected in recent years which shows that the picture of land utilization based on patwaris' records, as at present maintained, is broadly correct and suggest that given adequate and effective supervision over their work, the patwari system can be depended upon to give reliable statistics of acreage. However, improvements in acreage statistics by enforcing adequate and independent supervision over the work of the patwari has been emphasized. Financial assistance, on matching basis, was given by the Centre to the States to induce them to take up the scheme for rationalized supervision during the Second Five Year Plan period.

TABLE II
TOTAL IRRIGATED AREA, ITS DISTRIBUTION AMONG CROPS AND TOTAL AREA UNDER DIFFERENT CROPS
(thousand hectares)

Particulars	1950-51	1955-56	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66*	1966-67*
<i>Irrigated area</i>									
(i) Gross irrigated area	22,563	25,642	27,980	28,460	29,453	29,707	30,704	31,133	32,754
(ii) Net irrigated area	20,853	22,758	24,661	24,884	25,665	25,888	26,600	26,657	27,478
(iii) Area irrigated more than once (i)---(ii)	1,710	2,884	3,319	3,576	3,788	3,819	4,104	4,476	5,276
<i>Area irrigated from different sources</i>									
(i) Government canals	7,158	8,025	9,170	9,339	9,686	9,862	10,080	9,887	10,267
(ii) Private canals	1,137	1,360	1,200	1,163	1,146	1,160	1,143	1,132	1,088
Total	8,295	9,385	10,370	10,502	10,832	11,022	11,223	11,019	11,355
(iii) Tanks	3,613	4,423	4,561	4,612	4,781	4,509	4,780	4,430	4,570
(iv) Wells	5,978	6,139	7,290	7,352	7,649	7,884	8,075	8,665	9,488
(v) Other sources	2,967	2,221	2,440	2,418	2,403	2,433	2,622	2,543	2,075
Total net irrigated area	20,857	22,758	24,661	24,884	25,665	25,888	26,600	26,657	27,478
<i>Crops irrigated</i>									
Rice	9,844	11,035	12,523	12,985	13,361	13,254	13,556	13,121	13,298
Jowar	463	625	655	672	683	720	680	713	741
Bajra	336	395	320	292	294	254	276	329	380
Maize	369	448	556	426	532	523	558	773	800

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Regi	333	388	412	362	350	344	348	350	377
Wheat	3,402	4,150	4,283	4,326	4,583	4,724	4,945	5,404	6,188
Barley	1,363	1,460	1,334	1,321	1,309	1,269	1,317	1,317	1,512
Other cereals and Millets	248	142	133	93	97	97	108	98	90
Total cereals and Millets	16,378	18,643	20,166	20,477	21,219	21,185	21,731	22,105	23,386
Gram	974	1,191	1,107	1,168	1,261	1,277	1,406	1,309	1,503
Tur or Arhar	11	10	12	12	10	10	14	10	17
Other Pulses	954	774	780	791	900	868	792	833	884
Total pulses	1,939	1,983(a)	1,899	1,971	2,171	2,155	2,212	2,152	2,404
Total foodgrains	18,317	20,626	22,065	22,448	23,390	23,340	23,943	24,257	26,790
Sugarcane	1,183	1,274	1,674	1,673	1,621	1,567	1,862	2,020	1,675
Other Food Crops	889	1,165	1,353	1,342	1,476	1,490	1,565	1,515	1,671
Total food crops	20,389	23,065	25,092	25,463	26,387	26,607	27,370	27,792	29,136
Cotton	465	834	967	1,039	1,089	1,261	1,292	1,265	1,330
Other non-food crops	1,709	1,743	1,921	1,958	1,977	2,049	2,042	2,076	2,388
Total Gross Irrigated area	22,563	25,642	27,980	28,460	29,453	29,707	30,704	31,183	32,754

(a) Includes 8 thousand hectares for which details are not available

Area under food crops

Rice	31,056	31,631	34,016	34,656	35,734	35,745	36,359	35,303	35,045
Jowar	15,554	17,447	18,426	18,220	18,402	18,370	18,023	17,621	18,072
Bajra	9,744	10,972	11,470	11,275	10,961	11,103	11,916	11,960	12,377
Maize	3,250	3,911	4,401	4,501	4,646	4,586	4,617	4,800	5,118
Regi	2,254	2,333	2,478	2,459	2,526	2,420	2,410	2,397	2,416
Wheat	10,010	12,704	12,931	13,505	13,589	13,619	13,453	12,542	12,878

*Provisional

Particulars	1950-51	1955-56	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67
Barley	3,198	3,405	3,140	3,309	3,021	2,774	2,675	2,633	2,335
Other Cereals and Small Millets	5,676	5,412	4,997	4,908	5,000	4,855	4,803	4,803	4,841
Total Cereals and Millets	80,642	87,717	91,899	92,893	93,779	93,372	94,256	92,059	93,582
Gram	7,803	9,844	9,274	9,502	9,192	9,353	8,875	8,015	7,955
Tur or Arhar	2,228	2,336	2,429	2,439	2,447	2,513	2,560	2,536	2,573
Other Pulses	10,523	11,428	11,962	12,387	12,739	12,458	12,728	12,247	11,033
Total Pulses	20,554	23,608	23,665	24,388	24,378	24,324	24,163	22,798	21,561
Total Foodgrains	101,196	111,325	115,564	117,281	118,157	117,696	118,419	114,857	115,143
Sugar	1,757	1,896	2,417	2,459	2,245	2,250	2,606	2,868	2,374
Condiments and spices	1,244	1,438	1,569	1,471	1,471	1,594	1,696	1,599	1,870
Fruits and Vegetables	2,249	2,356	2,649	2,669	2,887	2,940	3,039	3,184	3,287
Other food crops	650	1,112	1,195	1,159	551	1,095	1,242	1,120	1,159
Total food crops	107,096	118,127	123,394	125,039	125,311	125,575	127,002	123,628	123,633
<i>Area under non-food crops</i>									
Groundnut	4,406	5,238	6,467	6,893	7,286	6,892	7,375	7,673	7,611
Caster	593	583	466	486	470	484	441	406	409
Sesamum	1,957	1,851	1,575	1,702	1,922	1,743	1,805	1,854	2,196
Rape Seed and Mustard	1,058	1,242	1,145	1,366	1,425	1,387	1,240	1,227	1,311
Linseed	1,226	1,250	1,267	1,353	1,304	1,336	1,355	1,039	850
Coconut	615	650	716	722	784	792	818	846	861

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	1,113	1,116	1,141	1,190	1,124	1,098	1,104	1,124	1,060
Other Oilseeds									
Total Oilseeds	10,968	11,930	12,777	13,712	14,315	13,732	14,138	14,169	14,288
Cotton	5,655	8,372	7,610	7,973	7,731	8,219	8,359	7,955	7,742
Jute	561	699	633	922	850	871	849	813	830
Other fibres	451	589	519	708	650	644	603	571	557
Indigo	3	4	4	3	3	5	20	8	7
Opium	28	6	47	28	28	23	21	16	14
Coffee	90	711	120	127	132	134	142	148	146
Tea	323	320	328	329	332	333	337	341	346
Tobacco	379	415	401	418	408	441	407	373	415
Fodder Crops	5,390	5,959	5,773	5,949	6,086	6,117	6,495	5,948	7,472
Other non-food crops	949	766	1,166	1,001	916	869	856	1,306	1,117
Total non-food crops	24,797	29,184	29,378	31,170	31,449	31,389	32,227	31,648	32,934
Total Food and non-food crops	131,893	147,311	152,772	156,209	156,760	159,063	159,229	155,276	166,567

*Provisional

In the permanently settled areas, in Bihar, the State Government has already switched over from the *Chowkidari* system of reporting the acreage to that of complete enumeration, with the help of specially appointed field statisticians. In West Bengal, the State Government has changed over from the traditional method of reporting to random sample survey. Table 12 indicates the crops along with the years when the method of estimation changed in these States.

TABLE 12
CROPS AND METHOD OF ESTIMATION

<i>State</i>	<i>Crops</i>	<i>Year when the method of estimation changed</i>
Bihar	Rice, maize, wheat, barley, gram, sugarcane, jute and tobacco	1948-49
	Jowar, bajra, ragi, sesamum, rape and mustard, linseed and castor seed	1949-50
West Bengal	Rice	1947-48
	Gram	1948-49
	Wheat, barley, linseed, rape and mustard	1949-50
	Sugarcane	1950-51
	Jute	1951-52
Orissa	Rice and jute	1959-60

In the case of jute, the acreage was based on random sample Surveys in 1949-50 and on eye-estimates in 1950-51. Since 1951-52, it has been based on random sample surveys except for Darjeeling District. Table 13 gives an idea of the area covered under crop cutting surveys in respect of different crops.

NSS Series of Acreage Statistics

During the regular rounds of NSS, data on land utilization showing area under different crops are being collected on the random sampling basis. Estimates of area under crops are given in terms of 'gross area' and 'allocated area'. The 'gross area' under a crop is defined as the area under the crop grown singly

TABLE 13
AREA UNDER PRINCIPAL CROPS ON WHICH CROP-CUTTING SURVEYS HAVE BEEN
CONDUCTED AND TOTAL AREA UNDER THE CROP, 1964-65 AND 1963-64
(thousand hectares)

Crop	Total area		Area on which crop-cutting surveys have been conducted		Percentage of area under principal crops on which a.c. surveys have been conducted to total area	
	1964-65	1963-64	1964-65	1963-64	1964-65	1963-64
<i>Cereals</i>						
Rice	36,076.4	35,622.2	35,032.6	34,615.2	97.1	97.2
Jowar	18,012.0	17,956.3	17,983.1	17,920.3	99.8	99.8
Bajra	11,712.1	10,785.4	11,642.8	10,722.0	99.4	99.4
Maize	4,591.1	4,584.2	4,195.8	4,199.8	91.4	91.3
Ragi	2,429.3	2,400.1	1,965.9	1,942.2	80.9	80.9
Small millets	4,554.9	4,579.5	1,285.7	1,311.7	28.2	28.6
Wheat	13,453.4	13,495.7	13,241.4	13,267.6	98.4	98.3
Barley	2,667.6	2,774.9	2,606.2	2,713.3	97.7	97.8
Total cereals	93,498.8	92,193.3	87,953.5	86,692.1	94.1	94.0
<i>Pulses</i>						
Gram	9,010.5	9,376.1	8,864.2	9,229.4	98.4	98.4
Other kharif pulses	6,396.2	6,197.3	...	...	...	...
Tur	2,473.4	2,440.8	1,913.0	1,905.0	77.3	78.0
Other rabi pulses	6,106.0	6,040.3	2,147.8	2,308.2	35.2	38.2
Total pulses	23,986.1	24,054.5	12,925.0	13,443.6	53.9	55.9
Total foodgrains	17,42.9	116,252.8	100,875.5	100,135.7	85.9	86.1

Continued

Crop	Total area		Area on which crop-cutting surveys have been conducted		Percentage of area under principal crops on which c.o. surveys have been conducted to total area	
	1964-65	1963-64	1964-65	1963-64	1964-65	1963-64
<i>Oil seeds</i>						
Groundnut	7,072.0	6,808.8	5,730.4	5,499.9	81.0	80.8
Castorseed	449.4	477.4	...	...	...	...
Sesamum	2,503.1	2,583.2	1,265.0	1,178.3	50.5	49.2
Rapeseed & mustard	2,513.8	3,022.6	744.6	832.1	29.5	27.5
Mustard linseed	2,010.7	2,006.3	928.4	944.8	45.9	47.1
Total oilseeds	14,849.0	14,710.3	8,683.4	8,455.1	58.3	57.5
<i>Fibres</i>						
Cotton	8,153.8	8,160.0	7,028.6	7,012.9	86.2	85.9
Jute	841.3	868.1	331.6	856.2	39.8	98.6
Mesta	359.1	393.4	57.0	64.8	15.9	16.5
<i>Other crops</i>						
Sugarcane	2,544.1	2,256.9	2,112.1	1,868.6	83.1	82.8
Potato	416.6	405.0	202.5	193.8	48.6	47.9
Tobacco	428.1	440.3	...	not available	...	...
Chillies	713.5	727.5	44.9	46.7	6.3	6.4

Source : Estimates of Area and Production of Principal Crops in India, Directorate of Economics and Statistics, Min. of Food, Agriculture, Community Development and Cooperation.

(pure) together with the total area under all mixed crops having that crop as one of the components. The allocated area under a crop is defined as the area under the crop grown singly plus only the apportioned area under the crop from all the mixed crops having that particular crop as one of the components. For obtaining the apportioned area under the crop, gross area under a mixed crop is allocated to its different components at the plot level by an eye estimation on the basis of the relative intensity of plants. The estimates are presented for all-India and census zones.

A comparison between the NSS estimates of acreage under cereals and the official estimates shows close agreement at the all-India level. The agreement, however, is not sufficiently close in the case of zone-wise and crop-wise figures. The differences may be accounted for by (i) the differences in coverage of crops/seasons, (ii) non-comparability of the experience in the field work between the two agencies, (iii) mis-classification of area under the grain crop and the fodder crop, (iv) differences in the methods of allocation of area under mixed crops, and (v) possible sampling errors.

Pre-harvest Surveys

Advance estimates of crop production have become extremely necessary in planned economy for policy and administration particularly for the preparation of National Food Budget. An experiment was first made by the National Sample Survey by launching large-scale sample surveys to obtain pre-harvest estimates of crop acreages of the principal crops. Field work was conducted by the Patwaries under the State authorities and processing was done by three agencies—the State authorities, the Directorate of National Sample Survey, Government of India and the Indian Statistical Institute. The scheme had, however, to be given up because of a number of administrative and technical problems.

Such advance estimates are now being prepared on the basis of qualitative information obtained from the States and also reports received from Inspecting Officers of the Marketing Intelligence Unit of the Food and Agriculture Ministry posted in the various States. These cannot in any way be considered as fully reliable and scientific.

A new scheme for timely reporting of estimates of area and production of crops has been prepared and is being implemented in the States of Uttar Pradesh and Maharashtra. It is proposed to try it out

in these two States and also Mysore and Bihar in the first instance. It will be extended to other States after gaining experience. It is hoped that the scheme when fully implemented, will solve the problem of timely availability of reliable data on advance estimates of area under principal crops and crop estimates. Full details of the scheme are discussed in Chapter 7 dealing with Production Estimates.

Supervision of Crop Area Enumeration

According to the instructions laid down in the Land Records Manual, the patwari is required to move from village to village and inspect each *khasra* (field) number and record its areas under different crops and other land-uses in a register called the *khasra* register.

The Revenue Inspector has to visit each village at least once in each field inspection season, and check the land-use and crop statistics recorded by the patwari in respect of a few *khasra* numbers selected in rotation. Some *khasra* numbers are also revisited before they come in rotation of inspection as an extra check against possible neglect of work by the patwari.

The Superintendents and Assistant Superintendents of Land Records are required to tour for 130 to 150 days in the year and inspect each patwari's work in villages selected by rotation. In the villages visited, they check 50 per cent of the entries in the *khasra* register already checked by the Revenue Inspector and a sufficiently large number of additional entries to ensure that the patwari has done the field inspection properly and the Revenue Inspector has verified his work correctly. The villages for supervision in a particular year are selected by rotation in such a manner that all are covered in a course of 5 to 7 years.

Thus the Land Records Manual makes elaborate provision for adequate supervision of patwari's work. The prescribed supervisions serve the twin purposes of improving the accuracy of basic agricultural data and imparting instructions to patwaris through actual spot inspection. The patwaris are also made familiar with the new concepts and definitions introduced in the field of agricultural statistics from time to time through personal contact and practical illustrations. This procedure, however, suffers from two defects. Firstly, the selection of villages and *khasra* numbers by rotation gives a prior knowledge to the patwari as to which villages and fields are not likely to be inspected in a particular year and how he can afford to neglect the work in them.

Secondly, the results of the supervision are not recorded in a suitable proforma so that they might be processed to give an idea of the extent of errors in the areas of different crops and land utilization recorded by patwaris.

During recent years, this revenue staff has been called upon to undertake multifarious duties connected with the various departments of Government. The village official has, therefore, not been able to devote due time and attention to the proper compilation of agricultural statistics.

The Technical Committee on Co-ordination of Agricultural Statistics, 1949, recommended *inter alia* that supervision over the work of the primary reporting agencies in the temporary settled areas might be rationalized by selecting the villages and fields to be inspected on a random basis. The advantages of this method would be two-fold. Firstly, it will put the primary reporter in the proper psychological frame of mind to report reliable data and secondly, it would be possible to develop correction factors for adjusting the figures as reported by the primary reporters for errors of omission and commission. The problem was further discussed at the State Agriculture and Co-operation Ministers Conference held in September 1953. It was observed that there was room for considerable improvement in the supervision of the work of the primary reporting agency and that steps should be taken to improve it on a rationalized basis.

Some of the cotton growing States initiated random checks in 1953-54 on a pilot basis. The results of the scheme were found to be encouraging and it was, therefore, decided that the scheme might be extended to cover all crops and land-use classes and taken up as a normal measure along with the existing crop inspection programme. A scheme was then prepared and circulated to the States. Under this scheme it was envisaged that the Kanungos and Tehsildars should do a part of their normal work of supervision in a rationalized way. For this purpose, 10 per cent of the villages are to be selected randomly. In the selected villages, 10 per cent of the fields selected on a random basis, are to be inspected. In respect of each selected survey number, the Kanungo is required to note down the entry made in the *Khasra* register on the basis of the crop inspection done by the Patwari and also the area under the crop grown according to his own spot inspection. On the basis of these two sets of figures, the State statisticians may work out correction factors at the district level, if considered necessary.

The States of Madhya Pradesh, Bombay (before bifurcation) and Bihar took up the scheme on a state-wide scale during the Second Five Year Plan. The States of Punjab, Madras, Rajasthan, Mysore and J & K have taken up the scheme on a pilot basis in a few districts only. In Assam, this scheme was taken up in the five plain districts during the year 1956-57, but was not continued in subsequent years.

Table 14 compares the two sets of figures in Madhya Pradesh for 1957-58.

TABLE 14
RATIOS OF AREAS AS RECORDED BY PATWARIS (p) TO THOSE
OF RATIONALIZED CHECK BY REVENUE INSPECTORS (r)
AND SUPERIOR LAND RECORDS OFFICERS (s) FOR
THE WHOLE STATE

<i>Crops</i>	<i>Ratios p/r</i>		<i>Ratios p/s</i>	
	<i>1957-58</i>	<i>1958-59</i>	<i>1957-58</i>	<i>1958-59</i>
Paddy	1.0170	1.0071	1.0060	1.0048
Jowar	1.0132	1.0015	0.9906	0.9930
Wheat	1.0104	1.0140	0.9376	0.9048
Gram	1.0057	0.9865	0.9619	1.1067
Cotton	1.0226	1.0058	1.0054	0.9995
Linseed	1.0016	1.0036	0.9022	1.0273
Maize	1.0156	1.0036	0.9818	1.0666
Tur	0.9818	0.9871	1.0303	1.0029
Groundnut	0.9877	1.0145	0.8273	1.0538
Sesamum	0.9743	0.9742	0.9998	1.0823

Source : R. Giri, *Rationalized Supervision of Crop Area Enumeration*
Agricultural Situation in India, April, 1961.

These results go to show that the acreage statistics compiled from patwari papers (as at present maintained) do not, with all their shortcomings, give cause for alarm at least in respect of major crops and important administrative units like the district, division or the state as a whole. In the years ahead, this type of rationalized supervision may be exercised in respect of all crops—single or mixed, in the different parts of the country.

A comprehensive scheme is now being launched under the Fourth Five Year Plan for the improvement of crop statistics. Besides the other items discussed elsewhere, it will provide for central supervision of area enumeration and obtain independent estimates of crop area with the help of State and Central statistical agencies and in the process obtain correction factors for adjusting the area estimates furnished by the State revenue agencies. The position as it exists, the scheme will be implemented by the Directorate of National Sample Survey. A proposal is, however, at present under consideration according to which the Agricultural Statistics Division of the NSS Directorate may be shifted from the Department of Statistics to the Department of Agriculture.

Deficiencies in the Crop Acreage Data

The existing deficiencies in the acreage statistics may be listed as follows :

1. There are areas for which no agricultural statistics are as yet reported. The statistics of acreage would remain incomplete, until every bit of land is measured. This will be possible only when every village in the Union is cadastrally surveyed and mapped.
2. The acreage data, available for the various States, are not of uniform standard. The figures available for the permanently settled areas are less reliable.
3. No forest is issued for some crops.
4. No reliable estimate of area under the various tree-crops is available at present. The information available is purely subjective.
5. No satisfactory formula has so far been evolved to apportion crop mixture into its constituents. Some confusion still prevails in the matter of estimating the area under the field boundaries.

Specific measures are already in hand to remove these defects.

Area under mixed crops

Sowing of two or more crops in mixture is practised more or less all over India. The problem of correct recording of area under mixed crops becomes difficult on account of the fact that even within a State or a district, cultivators practise quite a large number of mixtures. Further, there is considerable variation in the proportion

of seeds of the components sown in the case of the same type of mixtures from area to area and even from field to field. Again, the method of sowing of mixtures also varies considerably. Mixtures may be sown either broadcast or in rows, the number of rows of the crop alternating with those of another crop may vary.

Methods of recording areas under mixed crops have to be considered in relation to (i) estimation of total production of crops, and (ii) estimation of area under the components. In so far as the former is concerned, the difficulty of estimating accurately the area under each of the component crops does not affect the accuracy of the estimated out-turn if the gross area under the mixture is recorded separately and the average yield per acre in respect of mixed crops is also estimated on the basis of the gross area. In practice, however, this may not be easy as for the same crop there are numerous mixtures and it might be difficult to record the gross area under each of these mixtures. This would add considerably to the work at primary and subsequent levels. In regard to the estimation of the acreage under the component crops in the mixtures, apportioning has, however, to be done and the net areas under crops presented to give an account of the utilization of the area.

The question of the adoption of a scientific method for recording the area under mixed crops both for purposes of yield estimation and land utilization statistics was considered by the Technical Committee on Co-ordination of Agricultural Statistics and it was recommended that :

- (i) In all cases, gross unadjusted acreage of the mixture should be recorded separately for each major crop mixture and published in the Season and Crop Reports and Crop Forecasts along with the net acreages of the components.
- (ii) Where fixed rates are used for apportioning the areas under mixtures, they should be fixed for each district and their accuracy should be tested at periodical intervals during the crop-cutting surveys.
- (iii) For minor crop mixtures, the areas should be allocated to the various components by eye judgement at the field level. In these cases only net acreages after apportionment need be recorded and there is no necessity for recording the gross unadjusted acreage under minor crop mixtures.²

The main principle on which the above proposals were based is that the estimates of total production should be based on gross area and that the net areas under crops need be presented only to give an account of the utilization of the area. These recommendations were subsequently considered by the State Statisticians. The criteria for deciding whether a particular crop mixture is major or minor were laid down as follows :

- (i) order of importance of the component crop ;
- (ii) extent of area under the mixture ; and
- (iii) actual percentage of the constituent crops in the mixture.

It was further laid down that the method of calculating the net acreage under the component crops of a major crop mixture should be to divide the gross acreage under the mixture in the proportion of corrected seed rates, i.e., the seed rates of the component crops should be reduced to a common scale. Thus if a lbs. and b lbs. are the seed rates of two component crops in a mixture and if m lbs. are their normal seed rates when sown pure, the proportion of the area under the two crops will be $a/m : b/m$.

Present Position

With due consideration to the recommendations discussed above, improvements have been made from time to time. The position as it exists today is that gross areas of some major crop-mixtures as widely practised, are published by some States in their annual Tables of Agricultural Statistics and/or Season and Crop Reports. In respect of other crop mixtures in these States and all crop-mixtures in other States, the proportionate net areas of each component crop from all crop mixtures involving it are obtained and added to the area sown singly (pure) with it to give its net area which alone is published.

The allocation of gross area of a crop-mixture to its different component crops is done either at the source, i.e., at the field level, by the patwari during the course of his crop-inspection (*girdawari* or *partial*) and the net area of each component crop is recorded separately in the crop statement (*jinsuar*), or the patwari is allowed to record the whole area of crop-mixture treating it as a single crop and the total area of the mixture is separated to the component crops at the district level. The assignment of net areas to different component crops at the field level is made in proportion to the number of their rows, if

they are sown in separate lines. In case the crops in the mixture are sown after thoroughly mixing the seeds, this allocation is done in proportion to actual amount of seeds sown or seed-rates adjusted for mixed sowing or by eye-estimation of the relative stands of component crops. The components occupying negligible area or area below certain specified minimum are in some States, ignored and their areas allocated to the chief component alone or proportionately to all component crops of a mixture. The apportionment of net areas of component crops of a mixture at the district-level is done on the basis of a fixed ratio which is supposed to represent the average conditions with regard to one or more of the aforesaid factors for all the fields of the mixture in the district.

The different States in India can be grouped under the following 3 categories with regard to the procedure followed in the allocation of net areas of component crops of a mixture :

1. States in which allocation is done entirely at the field level.
2. States in which certain major crop-mixtures are recognized as single crops and allocation of net areas of their components is done not at the field level but at the district level, while in the case of unrecognized mixtures the allocation is done at the field level.
3. States in which the allocation is done entirely at the district level on the basis of fixed ratios.

1. *Allocation at field level :*

Under the first category can be listed the States of Assam, Bengal, Andhra Pradesh, Madras, Mysore, Orissa, Maharashtra, Gujarat and Kerala. In most of these States mixed cropping is not very important.

In *Assam*, mostly two crop-mixtures are reported to be sown. The practice of sowing three or more crops as substantial components of the mixture is rare. Therefore, the Land Records Manual prescribes a simple rule that the gross area should be allocated half-half between the two principal components, the subsidiary crops, if any, being ignored altogether.

The acreage under crop-mixtures is reported to be small in *West Bengal* also. No special procedure is, therefore, laid down for plots having mixed crops. The instructions to the field staff are that in such cases, an estimate of the extent of each individual crop in terms of

number of plants covering the field should be made. Taking the entire plot as equivalent of 16 annas, the area should be allocated to each crop so as to total to 16 annas for all crops in the plot.

The Land Records Manual for the Telangana region of *Andhra Pradesh* prescribes that if the constituent crops are sown in separate rows, the area of the mixed field should be allocated to them in proportion to the number of their rows. But if the seeds of constituent crops are mixed together and then sown, the net areas of component crops should be apportioned in the ratio of adjusted seed rates. For example, if a seers, b seers and c seers are the seeds employed for sowing a mixture of three crops in an acre of land and if l seers, m seers and n seers are their normal seed-rates when sown pure, the proportion of the areas of the constituent crops is estimated as $a/l : b/m : c/n$. If one or two components of the mixed sowing are not important and their proportions are extremely small, say a few plants scattered here and there in the field, they are ignored, and the whole area is shown as pure provided the remaining constituent crop is one only, if the remaining constituent crop still happens to be a mixture, the net acreage under each of them is separated on the basis of adjusted seed rates as explained above.

In the remaining parts of Andhra Pradesh and the whole of *Madras*, *Mysore*, *Orissa* and *Gujarat States* and the whole *Maharashtra State* excepting *Wardha*, *Bhandara*, *Nagpur* and *Chanda Districts*, the area occupied by components of a crop-mixture are apportioned on the spot by the primary reporting agency presumably in proportion to the number of their rows in the case of row-sowing and by eye-appraisal of the relative stands of their plants in the case of mixed-seed sowing.

In *Kerala*, the procedure adopted in the case of a mixture of a perennial crop and seasonal crop is to record the number of trees and plants of the perennial crop and the area actually under the seasonal crop. In the case of mixtures of two perennial crops, the number of trees or plants of each is recorded separately. In the case of the mixture of two seasonal crops, the procedure of the 'corrected seed rates' is followed and the apportionment is done on the spot by the Investigators.

2. Allocation partly at field and partly at district level :

Under the second category can be grouped the States of Bihar,

Punjab, Rajasthan and Jammu & Kashmir. In *Bihar*, the field-level primary reporter (Karmachari) records the gross area in the case of wheat-gram, wheat-barley and barley-gram mixtures without apportioning net areas of the components. In respect of other mixtures, he apportions the gross area to component crops by taking into consideration the quantities of seeds sown and the nature and extent of the crops grown, assessed on the basis of his own personal knowledge and judgement and information gathered from reliable and intelligent cultivators. The components which appear to occupy one per cent or less area of the whole field are treated as nominal crops and are ignored and their areas are distributed to the remaining components. If one or more additional components are sown mixed with a recognised two-crop mixture and each appears to occupy more than 1 per cent of the area of the mixed field, the area of each one of them is apportioned and recorded under it and the balance is recorded under the recognised mixture.

In *Punjab*, the patwari records at the source both the gross unadjusted acreages and the net acreages of the components of the mixture of wheat and gram ; wheat and barley ; wheat, gram, barley and massar ; wheat and sarshaf ; wheat, gram and sarshaf ; barley and gram ; jowar and bajra ; jowar and gowara ; jowar and moth or mung or mash ; bajra and moth or mung or mash ; matze and mash ; cotton, til and mash or moth or mung ; barley and massar ; and gram and massar which constitute the major crop-mixtures in the State. In respect of the mixtures of wheat and barley, and wheat and gram, half the area under the mixtures is reckoned as under-wheat. In the case of other mixtures, the patwari makes an eye-appraisal of the ratios in which the mixtures are grown and apportions the gross area to the component crops at the source itself.

In *Rajasthan*, crop-mixtures like gojara (wheat-barley), gochani (wheat-gram), bejar (barley-gram), jowar-mung and bajra-moth are entered as mixed in the crop-statement and areas of the components are not apportioned by the patwari. But in the case of other mixtures, the estimated area covered by each constituent is recorded.

In *Jammu & Kashmir*, allocation of area under mixed crops to its components is done at the primary stage except in the case of goji (wheat-barley). The patwari makes the allocation according to eye-estimate taking seed-ratio also into consideration. In the case of goji, the acreage is recorded as such from the primary stage to the final stage.

3. Allocation at district level :

Under the third category can be placed the States of Uttar Pradesh and Madhya Pradesh. In *Uttar Pradesh*, some major crop mixtures like jowar-arhar, bajra-arhar, cotton-arhar, wheat-barley, wheat-gram and barley-gram are recognized and are each allotted a column in the crop statement (jinswar). In the case of recognised crop-mixture, with or without some subsidiary crops also added, the whole area is recorded under the heading mentioned in the crop statement. Obviously, if a crop-mixture consists of 3 or more crops but the heading recognizes only two crops, the whole area is recorded under this heading, the subsidiary crops being ignored altogether. For example, the whole area of wheat-barley-linseed mixture is recorded under the heading 'wheat-barley' as there is no such heading as 'wheat-barley-linseed' in the crop-statement and thus the linseed crop is ignored totally at the field level. Other oilseeds crops like rape and mustard, sesamum, castor and groundnut are also ignored in a similar manner at the field-level. However, in the case of mixed linseed, its net area is calculated at the district level by taking half the total acreage under gram plus one-sixth of the total acreage under wheat and barley and their mixtures. Some such procedure is followed in respect of rapeseed and sesamum crops also. But no such calculation is made in the case of other oilseed crops sown mixed.

In all the constituent units, viz., Mahakoshal, Madhya Bharat, Vindhya Pradesh and Bhopal regions of the present *Madhya Pradesh* State, and Wardha, Nagpur, Chanda and Bhandara districts of the Maharashtra State, a few recognized mixtures like cotton-tur (arhar), jowar-tur, bajra-tur, wheat-gram, wheat-barley, barley-gram, wheat-linseed-gram, urad-linseed, lakh-linseed, kodo-tur, koda-jowar, koda-jowar-arhar, etc., are allotted separate columns in the crop-statement (jinswar) and the areas of these mixtures are recorded as such under the respective columns. If a mixture to which no special heading is allotted in the crop-statement is sown, it is described by the name which it ordinarily bears and its mixed area is recorded. There is, however, one important difference between the Mahakoshal, Madhya Bharat and Bhopal regions on the one hand and Vindhya Pradesh region on the other, with regard to recording of areas of subsidiary crops which are added in the main recognized or widely practised mixtures. In the first three units, the subsidiary crops are ignored, but in last unit, the area covered by each subsidiary crop is estimated on the basis of quantities of seeds sown and relative stands of component crops and apportioned and recorded separately by the patwari on the

spot and the balance is shown under the recognized mixture.

The assignment of net areas to component crops at the district level in the case of recognized mixtures in the States listed under second and third categories above, is done on the basis of prescribed ratios. The ratios fixed in the different States are given in Table 15 for important crop mixtures for illustration :

TABLE 15
RATIO FIXED FOR APPORTIONMENT OF NET AREAS OF
COMPONENT CROPS OF THE MIXTURE

<i>State</i>	<i>wheat-gram</i>	<i>wheat-linseed</i>	<i>gram-linseed</i>	<i>wheat-barley</i>	<i>gram-barley</i>
Uttar Pradesh	50 : 50			50 : 50	75 : 25 to 50 : 50@
Madhya Pradesh	90 : 10 to 50 : 50@	95 : 5 to 50 : 50@	95 : 5 to 20 : 80@		
Punjab	50 : 50			50 : 50	50 : 50
Bihar	50 : 50			50 : 50	50 : 50
Rajasthan	70 : 30 to 39 : 61@			66 : 34 to 34 : 66@	50 : 50 to 34 : 66@

@ The range indicates that different ratios are prescribed for different tracts or districts.

Source : Report of the Technical Committee on Crop Estimates. Planning Commission, 1967, p. 112.

The above ratios were fixed mostly at the time of settlements and were based on scanty observations. The characters which were observed by the Settlement and Revenue Officers for fixing these ratios are not clearly specified in the circulars which prescribe them but the basis had been an admixture of all types of observations and subjective assessments made with regard to relative stands of crops, pure and mixed seed-rates, relative spread of the practices of line-sowing and broadcast sowing, etc.

4. Allocation when components are harvested in different seasons

Crops sown in mixture simultaneously or in the same season are

generally treated as mixed crops, whether they are harvested in the same season or in different seasons. Thus, in most States jowar-tur (arhar), cotton-tur, maize-tur, kodo-tur, the components of which are sown simultaneously in the kharif season, but the first component is harvested in kharif and the second in the rabi season, are treated as mixtures and the whole gross area is divided between the component crops at the field or district level, according to the prevalent practice. The whole area of such mixtures is treated as double-cropped and is recorded under the first component (maize or kodo, etc.) in the kharif season as well as under the second component (arhar) in the rabi season.

6

Estimation of Crop Yields

Random Sampling Method

RANDOM SAMPLING is a procedure based on the law of chance, of selecting a part of the material to represent the whole. Its merit lies in reproducing the characteristics of the total population under study as closely as possible with the help of the sample chosen. Thus, if the material under study is an aggregate of rice growing fields, random sampling would ensure that the characteristics of the population of rice fields such as the yield, the proportion of irrigated to unirrigated fields, of manured to unmanured fields, etc. are reflected in the sample as closely as possible.

The method is entirely objective and rules out the possibility that the outcome of the draw in the sample will be influenced by the worker. A further advantage of the method is that it provides a means of knowing how far the results based on such a sample are likely to differ from the true value for the entire aggregate from which the sample is drawn.

Panse and Kalamkar actually demonstrated the practicability of the method by conducting experiments on cotton in Madhya Pradesh in 1942-43. The Inter-Departmental Committee, in 1943, carefully considered the question of applying the random sampling method for the estimation of food crops and called upon the Indian Council of Agricultural Research to evolve a suitable technique of random

sampling which could be used for conducting annual surveys for estimating the yield of major food crops of wheat and paddy on a country-wide basis. The Indian Council of Agricultural Research while initiating the surveys, had the following objectives in view :

- (a) To evolve a random sampling technique for conducting crop-cutting experiments which can be handled by the staff of the Provincial (now State) Departments of Agriculture and Revenue, who are ordinarily entrusted with these experiments, and which can be adopted by them as a departmental routine without heavy additional expenditure.
- (b) To demonstrate to the administration the feasibility of adopting the method so devised as a normal routine.
- (c) To train the existing staff in the States in the techniques.
- (d) To estimate the yield per acre for the State as a whole and also for individual districts.
- (e) To revise the present set of district normal yields in due course.

Coverage of Crops

With these objectives in view, surveys have been conducted annually on wheat and paddy since the rabi season of 1943-44 gradually extending them almost to all the wheat and paddy belt.

The surveys on the wheat and paddy crops were a direct responsibility of the Indian Council of Agriculture Research but the Council was also increasingly called upon to offer technical advice on the extension of the surveys to other crops as the usefulness of the surveys began to be appreciated. The Government of Madhya Pradesh requested the Indian Council of Agricultural Research to initiate a state-wide survey on jowar in 1946-47 and it has been continued since then. In West Bengal, surveys were originally conducted under the direction of the Indian Statistical Institute. These are now being conducted by the State Statistical Bureau. In respect of other States, these surveys are now mostly conducted by the Departmental staff under the over-all supervision and guidance of the Directorate of National Sample Surveys of the Ministry of Finance.

A number of States now mostly take into account the results of crop-cutting experiments for preparing the post-harvest estimates of production in respect of some major crops.

Scale of Experimentation

In paddy and wheat on an average, between 60 to 200 crop-cutting experiments are conducted in each district, depending upon the area under the crop, the level of accuracy aimed for the yield estimate and the strength of the field staff available. The ratio of the area actually harvested for the purpose of experiments to the total area under the crop, known as the sampling fraction, varies from State to State in the range of 5 to 20 parts in a million.

Methodology

A crop-cutting experiment under the present surveys consists of location and marking, as per instructions laid down (Appendix 4), a plot of a given size in a field growing the crop in question, harvesting, threshing and winnowing the produce within the plot and weighing the grain obtained. Since the grain on the harvesting day contains moisture, it is stored and re-weighed after driage. It must be emphasized that the procedure adopted for harvesting and processing the produce on the harvesting day conforms to that prevalent among the cultivators. The sample, therefore, provides an unbiased estimate of the produce on the harvesting day. However, for the purpose of driage, the grain collected from the sample is stored in bags whereas the general harvested produce of the cultivator is kept lying in fields and any damage caused to this as a consequence of adverse conditions subsequent to harvesting is naturally not reflected in the sample estimate. The method of estimation of average yield is generally as follows :

In each stratum, a simple arithmetic mean of net yield of the sample plots is obtained. For this, the plot yield from a mixed sown field is divided by the eye-estimate of the proportion of the area under the crop in the field and added to the yields of the plots sown with the pure crop to obtain an estimate of the stratum average. The district average is obtained by combining the district average in proportion to the net area under the crop in the districts. The averages are corrected for driage experiments.

In some States, there are certain variations in the estimation procedure. For example, in Uttar Pradesh, the district averages are obtained separately for the pure and mixed categories of a crop (without dividing the actual plot yield of the field under mixture by the eye-estimate of the proportionate area under the crop) and the

total production is got by weighing these averages with the respective areas under pure-sown and mixed-sown types of the crop. The production thus obtained is then divided by the estimated net area under the crop to give the district estimate of the net average yield. Net area under the crop in Uttar Pradesh is worked out at the district level on the basis of fixed ratios between crops grown-mixed.

No allowance for the uncropped area of peripheral or interior field-bunds which are included in field areas, and thus in crop areas, is made in the production estimates obtained on the basis of the above calculation except that a deduction of 2 to 5 per cent for such bund area is made in Assam, Andhra Pradesh and Bihar for rice, in Madhya Pradesh for rice and wheat and in Mysore for all crops¹.

Domain of Study

As the purpose of the surveys has been to estimate the average per acre yield for each State and its chief Divisions and the quinquennial average yields for each district, the domain of study, technically speaking, for each individual survey has thus been the State as a whole and its chief Divisions, while for the quinquennial period it has been an individual District. However, the desirability of providing the annual yield estimates for the major districts for the production of a particular crop has always been kept in view.

The field of enquiry for a survey comprises the total area under the crop in question. Inaccessible regions are excluded, which, however, constitute a very minor fraction of the total cropped area.

Design of Survey

The design of sampling adopted in the present surveys is technically known as the stratified multi-stage sampling in which the region to be surveyed is first sub-divided into sub-regions called strata from each of which a certain number of sampling units, namely experimental plots, are selected at random, the drawing of sampling units proceeding in successive stages of selection. But in West Bengal and Orissa, tehsils/revenue inspector circle/sub-Divisions, (containing 100 to 300 villagers), serve as strata, a village as the primary unit of sampling, of field growing the specified crop (pure or in mixture

1. R.S. Chada, *Crop Estimation of Surveys in India, Agricultural Situation*, Jan, 1962.

with other crops) as the secondary unit of sampling. As regards West Bengal, the whole of the State is divided into grids of size 2.25 acres.

A random sampling of grids at the rate of 1 for every half a sq. mile is chosen from all the *Thanas*. Odd number grids of the 'A' sample is chosen for the crop-cutting survey and from each selected grid generally one cut is taken for a crop. In Orissa, the whole State has been divided into strata consisting of groups of contiguous *Thanas*; from each stratum two independent sub-samples are selected for area estimation and from each of these sub-samples, 5 villages are sampled for yield survey and 3 crop-cutting experiments are conducted in each selected village.

The allocation of experiments between the strata is done generally in proportion to the acreage under the crops. Two to six villages are selected per *taluka*, 2 fields (sometimes 3 as in Maharashtra or even 5 as in the case of paddy in Kerala) are selected in each village for each crop. The selection at each stage, of village, fields and plots is made in accordance with the random principle.

The selection of villages and even of fields in some cases is carried out directly by the statistical staff; the selection and demarcation of plots within fields is left to the field staff. A statement giving the shape and size of plots in different States for various crops is given in Table 16.

Field Organization

The field organization in States is drawn from the Revenue and/or Agriculture Department depending upon the administrative convenience. The staff to actually conduct the experiment is the Kanungo in Uttar Pradesh, the Revenue Inspector in Telangana area of Andhra Pradesh and the Agricultural Demonstration and Extension Officer (Agriculture) in Andhra area, the Circle Inspector (Revenue) or Amin, the Field Supervisory Investigator and Junior Statistical supervisor in Bihar, the Village Level Worker in Development areas and the Circle Inspector in other areas of Maharashtra and Gujarat, the *Girdawar* Kanungo or Revenue Inspector in Madhya Pradesh and Jammu & Kashmir, the Agricultural Demonstration/Inspector and Revenue Inspector in Madras, Mysore and Punjab and the Land Records Inspector in Rajasthan. These are generally below *tehsil* level supervisory officers in the States.

TABLE 16
STATEMENT SHOWING THE SHAPE AND SIZE OF THE EXPERIMENTAL
PLOT IN DIFFERENT STATES

Sl. No.	State	General				Exceptions	
		Shape	Plot-size	Crop	Shape	Size	
1.	Andhra Pradesh	Rectangle	1/100 acre (50 links × 20 links)	Tur, Cotton, Sesamum and Castor	Square	1/40 acre (33' × 33') or 50 links × 50 links.	
2.	Assam	Square	1/160 acre (16.5' × 16.5')	Potato	Square	1/160 acre (16.5' × 7') rows	
3.	Bihar	Rectangle	1/80 acre (33' 0" × 16.5')	Jute	Square	1/160 acre (16.5' × 16.5')	
4.	Gujarat	Square	1/40 acre (33' × 33')	Cotton	Rectangle	1/20 acre (66' × 33')	
5.	Jammu & Kashmir	Rectangle	1/80 acre (33' × 16.5')	All crops (in high altitude tracts)	Rectangle	1/120 acre (33' × 11')	
6.	Kerala	Square	1/160 acre (16.5' × 16.5')				
7.	Madhya Pradesh	Rectangle	1/80 acre (33' × 16.5')	Cotton	Rectangle (variable)	1/20 acre (approx. 66' × 22' rows).	
8.	Madras	Rectangle	1/100 acre (50 links × 20 links)	Sesamum Sugarcane Cotton	Square Rectangle Square	1/40 acre (33' × 33') 1/80 acre (50 links × 25 links) 1/40 acre (50 links × 50 links)	
9.	Maharashtra	Square	1/40 acre (33' × 33')	Tur & Cotton	Rectangle	1/20 acre (33' × 66')	(Contd.)

Sl. No.	State	General		Exceptions		
		Shape	Plot-size	Crop	Shape	Size
10.	Mysore	Square	1/40 acre (33' × 33')	Rice and Ragi	Rectangle	1/100 acre, 50 links × 20 links
				Cotton	Rectangle	1/20 acre (66' × 33')
				Castor	Rectangle (variable)	1/40 acre (approx.) 45' × av. no. of rows in 24'.
11.	Orissa	Circular	About 50 sq. feet			
12.	Punjab	Rectangle	1/80 acre (33' × 16.5')	All crops (in Kan- gra District)	Rectangle	1/120 acre (33' × 11')
13.	Refjasthan	Rectangle	1/80 acre (33' × 16.5')	Cotton, Sesamum, Linseed & Rape & Mustard	Square	1/40 acre (33' × 33').
14.	Uttar Pradesh	Equilateral triangle	1/92.4 acre (Equal Tri- angle of 35').	Sugarcane (fac- tory) Sarcane (non- factory) Cotton	Square	1/40 acre (33' × 33')
					Square	1/180 acre (16.5' × 16.5')
					Rectangle (variable)	1/20 acre (approx.) (66' × average) no. of rows in 33'
15.	West Bengal	Concentric circles with different radii	Above 100 sq. ft. circles 2 ft., 4 ft. & 5-65 ft.	Jute	Square	1/180 acre (16.5' × 16.5')
16.	Delhi	Rectangle	1/80 acre (33' × 16.5')	Arhar, Potato, Sugarcane	Square	1/194 acre (15' × 15').
17.	Himachal Pradesh	Rectangle	1/220 acre (33' × 6')			

In Assam special staff has been appointed for this purpose. The *patwaris* of the selected villages are required to render assistance in the conduct of the experiments, particularly in securing local co-operation. The results of experiment along with related information regarding selected fields are entered in given proformas by the field staff and sent directly to the State Statistician and the Indian Council of Agricultural Research. The ancillary information collected covers items like irrigation, soil type, variety of crops grown, etc., and, apart from its intrinsic value, also serves to check the representative character of the sample. On an average, a member of the field staff is allotted about 8-10 experiments for each season which he can efficiently conduct without prejudice to his normal duties.

Training of Staff

The field staff engaged in experimental work and that entrusted with its supervision are trained intensively in the method of work, the training being invariably accompanied by spot demonstrations. The need for associating the senior district officers of the departments with the training is imperative since it helps them to keep a vigilant eye on the work of the staff and make fruitful suggestions in improving the efficiency of work.

Checks on Field Surveys

When the list of selected fields for a given season is intimated to the field staff, the cultivators concerned are contacted and the staff prepares a schedule of work for the different fields in accordance with the probable harvesting dates and in consultation with the cultivators. A copy of the scheduled programme is required to be sent to superior officers to facilitate inspection. The surveys in all the States, except West Bengal and Kerala, are conducted under the technical guidance and supervision of the Directorate of National Sample Survey who maintains units of supervisory staff in all the states. At the State level the supervision over the field work is exercised by the departmental supervisors and by the Statistical Staff.

The supervision which normally covers at least 8-15 per cent of the experiments provides an invaluable check on the accuracy of the primary data collected. The State superior officers are required to attest on spot the results of experiments supervised by them and offer remarks on the efficiency of work. They are also required to send independently consolidated inspection reports embodying their

comments on the field work, and their suggestions have often been found to contribute considerably to simplifying the field work.

Some Suggestions

There is, however, yet scope for improvement in the system of inspection in several directions. For instance, the experiments to be supervised by the departmental officers could be a random sample of the total number of experiments conducted thereby increasing the representative character of the supervision and also making available an independent estimate of the yield on the basis of this sub-sample.

An investigation conducted by the authors revealed that a relatively large number of field samples selected in the crop-cutting experiments were drawn from larger holdings, the smaller holdings, although much larger in number than the larger holdings, did not get proportional representation in this method of sampling. The sample of field is, therefore, unrepresentative in respect of frequency of distribution of holdings in various size groups. However, justification to this procedure of sampling fields may be that larger holdings contribute proportionately a larger volume to the total production. But in the ancillary information, it would be worth while to include information on the size of holding to which the sample field belongs.

The data at present being compiled are regarding the acre yields of different crops up to the District level. No information is available below the District level and besides this, even at the District or the State level, separate information about irrigated and unirrigated yield is not available for any crop. It is desirable to extend the crop-cutting technique to obtain information on crop yields in relation to the size of the farm and major improvements such as irrigation *versus* non-irrigation, soil conservation, fertilizer programmes, etc.

Production Statistics

THE TOTAL production of a crop is calculated as the product of (a) the acreage under the crop, and (b) average yield per unit. The determination of yield involves (i) the fixing of normal yields, and (ii) determination of condition factor, e.g., the ratio of the year's crop yield to the normal yield. In the traditional or so called *annawari* method of estimating production, some years back, yields were estimated by eye-appraisal and, over a period of years, a certain normal yield was arrived at. In later years, yields were reported as percentage of the normal yield.

Earlier System

Normal or standard yields in the earlier period were defined as the average yield on an average soil in an year of average character. These standard yields were fixed for all time, but were subject to revision once in five years. In actual practice, however, they were seldom revised over a long period. In the case of Madras, for example, it was fixed as early as 1919 and never revised thereafter.

The 'condition factor' under the traditional method used to give the condition of crop in any particular season in relation to the normal crop. It was usually expressed in terms of annas, with sixteen annas¹ as representing the normal.

1. Before the introduction of the metric system, a rupee was divided into 16 annas.

TABLE 17
STATE-WISE POSITION REGARDING THE YEAR FROM WHICH THE METHOD OF RANDOM
SAMPLE CROP-CUTTING SURVEYS HAS BEEN ADOPTED FOR FRAMING
OFFICIAL ESTIMATES OF PRODUCTION

<i>State</i>	<i>Region</i>	<i>Crops</i>	<i>Year from which the Method of crop cutting surveys was adopted</i>
(1)	(2)	(3)	(4)
1. Andhra Pradesh	Telangana	Wheat ¹	1951-52
		Rice, Jowar, Bajra, Maize	1952-53
		Ragi	1955-56
		Sugarcane	1956-57
		Groundnut, Tur, Sesamum	1959-60
		Cotton and Tobacco	1962-63
	Andhra	Rice	1953-54
		Jowar, Bajra, Maize, Ragi, Sugarcane	1954-55
		Groundnut, Tur, Sesamum	1959-60
		Cotton and Tobacco	1962-63
2. Assam ²		Rice (Autumn & Winter) and Jute	1951-52
		Potato (Winter)	1952-53
		Sugarcane	1957-58

1. Discontinued since reorganization.

2. Plains only.

(1)	(2)	(3)	(4)
3. Bihar		Rapeseed and Mustard	1958-59
		Matikailai (Urad)	1963-64
		Potato (Summer)	1963-64
		Rice (Autumn & Winter) and Wheat	1948-49
		Barley and Gram	1949-50
		Sugarcane and Jute	1958-59
		Maize	1959-60
		Mesta, Potato (Summer) and Tur	1962-63
		Potato (Winter)	1963-64
			1949-50
4. Gujarat	Former Bombay State Portion	Rice (Autumn), Jowar, Bajra, Wheat	1949-50
		Maize, Gram, Cotton, Groundnut, Tobacco,	1951-52
		Ragi (Dangs district only) ³	1961-62
		Kodra	1956-57
		Rice, Wheat, Jowar, Bajra, Gram	1957-58
		Groundnut, Cotton	1961-62
		Kodra	1965-66
		Sesamum	1957-58
		Rice (Autumn & Winter)	1959-60
		Rice (Summer)	1959-60
5. Kerala	Gujarat State		

3. Discontinued after the formation of Maharashtra and Gujarat States.

(1)	(2)	(3)	(4)
6. Madhya Pradesh	Mahakoshal Region	Rice, Jowar, Wheat, Gram, Kodon-kutki, Tur Bajra Barley, Groundnut, Rapeseed & Mustard Linseed, Sesamum, Cotton, Lakh or Khesari and Potato (Summer) Maize Chillies Potato (Winter)	1951-52 1956-57 1957-58 1958-59 1962-63 1963-64
	Vindhya Pradesh Region	Rice, Jowar, Maize ⁴ Wheat, Barley, Gram Bajra Tur, Groundnut, Rapeseed and Mustard Linseed, Potato (Summer), Kodon-kutki, Sesamum, Lakh or Khesari, and Cotton Chillies Potato (Winter)	1952-53 1956-57 1957-58
	Bhopal Region	Rice, Jowar, Wheat Gram Bajra Barley, Tur, Groundnut, Rapeseed & Mustard, Linseed, Potato (Summer), Kodon-kutki, Sesamum Cotton, Lakh or Khesari Maize Chillies Potato (Winter)	1962-63 1963-64 1951-52 1952-53 1956-57 1957-58 1958-59 1962-63 1963-64

4. Experiments were not conducted during 1956-57 and 1957-58

(1)	(2)	(3)	(4)
	Madhya Bharat Region	Rice, Jowar, Gram Bajra	1955-56 1956-57
		Wheat, Barley, Tur, Groundnut Rapeseed & Mustard, Linseed Potato (Summer), Kodon-kutki, sesamum Cotton, Lakh or Khasari Maize Chillies Potato (Winter)	1957-58 1958-59 1962-63 1963-64
		Rice, Jowar, Bajra, Ragi Groundnut, Sugarcane, Cotton	1955-56 1964-65
	Former Bombay State Portion	Rice, (Autumn) Jowar, Bajra, Wheat Ragi—(Ratnagiri district —Kolaba, Nasik and Kolhapur districts —Thana, Poona districts) Cotton, Groundnut, Tobacco (Sangli and Kolhapur), Gram Tobacco (Satara)	1949-50 1951-52 1962-63 1964-65 1951-52 1958-59
	Vidarbha Region	Rice (Autumn) Jowar, Wheat, Gram, Kodon- Kutki, Tur (Nagpur Division only Cotton Groundnut Bajra	1951-52 1954-55 1957-58 1958-59
7. Madras			
8. Maharashtra			

(1)	(2)	(3)	(4)
	Marathwada Region	Wheat	1951-52
		Rice (Autumn), Jowar, Bajra, Maize ^a	1952-53
		Gram, Groundnut, Cotton	1957-58
9. Mysore	Maharashtra State	Sugarcane	1964-65
		Rice ⁵ , Jowar, Bajra, Ragi	1951-52
		Wheat, Gram, Tur	1957-58
		Sesamum, Sugarcane, Groundnut	1958-59
		Linseed	1961-62
		Cotton	1963-64
		Castorseed	1964-65
10. Orissa		Rice (Autumn & Winter) and Jute	1959-59
11. Punjab (Prior to 1.1.1966)	Including Pepsu	Bajra, Maize, Wheat, Gram	1952-53
		Sugarcane	1961-62
12. Rajasthan	Former Punjab States ⁶	Rice, Jowar, and Barley	1952-53
	Old State (i.e. Excluding Ajmer)	Wheat, Barley, Gram	1951-52
		Jowar, Bajra, Maize	1952-53
		Cotton	1953-54
		Rapeseed and Mustard	1957-58
		Sesamum, Linseed	1958-59

5. In Coorg from 1952-53

6. Includes Pepsu from 1955-56 in respect of Jowar and from 1956-57 in respect of Rice and Barley.

(1)	(2)	(3)	(4)
Uttar Pradesh	Ajmer	Wheat,	1952-53
		Jowar, Maize, Barley	1953-54
		Gram, Cotton	1956-57
		Rapeseed and Mustard	1957-58
	State excl. hilly regions of Kumaon and Uttar Khand Divisions	Sesamum, Linseed	1958-59
		Wheat, Barley, Gram	1949-50
		Rice, Jowar, Bajra, Maize, Tur	1950-51
		Jute	1955-56
		Groundnut and Rapeseed & Mustard (pure crop)	1957-58
		Peas, Sesamum (pure crop), Linseed (pure crop)	1959-60
Hilly regions of Kumaon and Uttar Khand Divisions	Sugarcane, Cotton?	1960-61	
	Masur	1964-65	
14. West Bengal	Rice, Ragi, Wheat Barley		1961-62
	Rice (Autumn & Winter)	1947-48	
	Wheat, Barley, Gram, Rapeseed & Mustard	1949-50	
	Linseed, Jute	1960-61	
	Sugarcane	1961-62	
	Potato (Winter)	1961-62	
	Tur, Rabi Pulses (except Kulthi & others)	1962-63	

7. Production was based on random sample surveys in 1953-54 and 1954-55 and on eye-estimates thereafter. Since 1960-61, the production estimates are a gain based on random Sample Crop Cutting Surveys.

8. In the case of Jute, production was based on random Sample Survey in 1949-50 and on eye-estimates thereafter. Since 1961-52, it has been based on random Sample Surveys except in the case of Darjeeling district.

(1)	(2)	(3)	(4)
15. Delhi		Wheat ⁹ Bajra Gram	1952-53 1964-65 1958-59
16. Himachal Pradesh (Prior to 1.11.66)		Rice, Wheat, Maize-excl. Chamba —Chamba Barley	1953-54 1958-59 1961-62 1964-65

9. Production estimates have been based on the traditional method since 1955-56 as the results of crop cutting experiments have not been available on a regular basis since that year. Since 1958-59 the production estimates are again based on crop cutting surveys.

Notes :

- (1) The years given in col. (4) indicate the years from which the production estimates based on traditional method have been replaced by production estimates based on the results of Random Sample Crop Cutting Surveys.
- (2) The Districts of former Bombay State included under Gujarat and Maharashtra States respectively are given below :—
 - (i) *Former Bombay State Portion included under Gujarat :*
Banaskantha, Mehsana, Sabarkantha, Ahmedabad, Kaira, Panchmahals, Amroli, Baroda, Broach, Surat and Dangs.
 - (ii) *Former Bombay State Portion included under Maharashtra :*
West Khandesh, East Khandesh, Nasik, Ahmednagar, Poona, Sholapur, North Satara, Thana, Bombay, Suburban, Kolaba, Ratnagiri, South Satara, Kolhapur.

This was purely a subjective estimate depending on the intelligence of the village official, Patwari, etc. The smallest unit for which this condition factor was given by the reporting agencies varied from a village to a *tehsil* in the various provinces. The figures supplied by the lower officials were passed on to their immediate superiors who made a further guess in the light of their personal experience. Final figure of average yield for the province was fixed by the Director of Land Records or the Director of Agriculture or both taking into account all available data.

Crop cutting surveys

It was only in recent years that the method of obtaining average yields through the estimation of condition factor has been gradually abandoned in all the States. Yields are now based mostly on crop-cutting surveys. Position regarding the year from which the method of Random Sample Crop-cutting Surveys has been adopted for framing official estimates of production is shown in Table 17. Full particulars of this method have already been examined in the previous Chapter. Appendices 5, 6 and 7 give brief notes on the sample design and estimation procedure followed in NSS crop surveys, official series of crop estimation surveys and non-NSS crop estimation surveys in Kerala, Orissa and West Bengal. Appendix 8 shows the primary field agency in the official series of crop estimation surveys.

Estimates for quite a few crops are still being obtained through less reliable methods due either to the unpracticability for applying statistical methods or the crop being of minor importance. Yield estimates are being published annually in the 'Estimates of Area and Yield of Principal Crops.' They are available for the following crops :

Cereals	— rice, jowar, bajra, maize, ragi, small millets, wheat and bajra.
Pulses	— gram, tur, other kharif and rabi pulses.
Other crops	— sugarcane, potato, pepper, ginger, tobacco, chillies, turmeric, guarseed and arecanut.
Oilseeds	— groundnut, sesamum, rape and mustard, linseed, castor-seed, nigerseed and sunflower.

Fibres	— cotton, jute, mesta and sunn-hemp.
Plantation crops	— tea, coffee, rubber and coconuts.
Minor crops	— indigo, papaya, sweet potatoes, tapioca, opium, lac, cashewnuts, cardamom and betel nuts.

All these crops are broadly divided into three groups, viz. Forecast crops, Non-forecast crops and plantation crops. Area, production and yield of principal crops from 1949-50 to 1968-69 is given in Appendix 9.

Forecast Crops

Regular all-India estimates are issued for the forecast crops. The figures in respect of cereals and gram relate to both reporting and non-reporting areas while those for other crops refer to reporting areas only. Figures for 'non-reporting' areas for other crops are not available. Estimates of area and production of food-grains for the 'non-reporting' areas for 1947-48 are based on the average for the seven years ending 1942-43, allowance having been made from year to year for the transference of a 'non-reporting' area to the 'reporting' basis. Estimates of these areas for 1948-49 onwards are based either on special returns received from the State Governments or information available in the Season and Crop Reports and the Returns of Agricultural Statistics. Figures for the 'non-reporting' areas for the two periods—(i) upto 1947-48 and (ii) 1948-49 onwards are thus not strictly comparable in coverage or method of estimation.

The number of crops included in this group is being increased and is now 34 in place of only 10, before the First Plan. Recently coconut, nigerseed, sunflower, turmeric, arecanut, guarseed and banana have been included in this category.

Non-Forecast Crops :

These cover papaya, sweet-potatoes, tapioca, sunnhemp, indigo, lac and opium. Estimates of area and production of these crops are *ad hoc* as distinct from the regular estimates of forecast crops and therefore, do not have the same degree of accuracy as the forecast crops,

Plantation Crops

The estimates of area and production of coffee and rubber are based on special returns received from the State Governments in connection with the all-India publications on these crops. Data regard-

ing tea are as extracted from the publications of the Tea Board from 1960-61 onward, while for earlier years the data were based upon returns received from State Governments. Coconut has since been included in Forecast Crops.

Some General Remarks

The following general remarks by way of explanation are of interest :

1. (a) Data for Assam exclude NEFA.
(b) Data for Jammu and Kashmir exclude the Pakistan-held portion of the State.
(c) Data in respect of foodgrains for Madhya Pradesh are inclusive of estimates for crops grown in forest areas also.
2. Figures of tea and rubber relate to calendar years, *i.e.*, figures for 1947-48 relate to 1947 and so on.
3. Average yields per acre are calculated by dividing the total production by the corresponding total acreage under each crop. In case of tea and coffee, they relate to 'plucked' area and in the case of rubber to 'tapped area'.
4. Data in respect of lac are as furnished by the Indian Central Lac Class Committee and those of opium by the Narcotics Commissioner, Simla.
5. Production of sunn-hemp is estimated in terms of dry fibre.
6. Figures for sesamum, rape and mustard and linseed in the case of U.P. are inclusive of estimates for areas sown under 'mixed crops.'
7. Production of sugarcane is expressed both in terms of cane and raw sugar (gur or jaggery).
8. Production of groundnut is given in terms of 'nuts in shell.'
9. Production of cotton is given in terms of 'lint cotton' and in bales of 180 Kgs. each.
10. Production data of cotton seed are provisional as they are worked out on the basis of approximate lint to seed ratio.
11. Production of jute and mesta is given in terms of fibre and in bales of 180 Kgs. each.

Fruits and Vegetables

The absence of production estimates in respect of a number of minor crops, *e.g.*, fruits and vegetables is a serious lacuna in the existing production statistics. Recognizing their importance as the primary source of nutritious food, the Planning Commission has already laid stress to increase their production. The *ad hoc* estimates of production available for some of the fruit and vegetable crops are not sufficient to meet the requirements of the situation. It is difficult to rely upon even the area figures under these crops.

The determination of their production involves some methodological investigations. The problem of recording the area under fruits and estimating their production is different from that of field crops. Fruit trees other than those grown in orchards, are scattered along the fields and as such an accurate determination of area under these scattered trees becomes difficult. Because of extensive mixed sowing the difficulty in the case of vegetables arises, in apportioning the area under the various vegetable crops.

The Indian Council of Agricultural Research has evolved proper techniques for the estimation of production in respect of plantations and other minor crops like coconut, pepper, fruits and vegetables. The extension of these surveys to all the producing areas are necessary. Provision is being made in the final Fourth Five Year Plan for this purpose.

Preliminary, Final, Partially Revised and Revised Estimates (official series)

First or preliminary estimate for a crop is generally issued about a month after the completion of sowings and is intended to give an idea about the area sown under the crop and to afford intelligence regarding germination, weather conditions, and crop prospects. The second estimate generally follows about a couple of months later and indicates the area (including late sowings), the condition of the crop and the probable or expected yield in some cases. The final estimate contains estimates of the total area sown and yield harvested or expected to be harvested. An important distinction between the object and purpose of the final and pre-final estimates needs to be borne in mind. While pre-final estimates are intended to give an indication of what the production is likely to be, the final estimate mainly concerns itself with the actual quantity produced. Further, for the pre-final estimates, the primary reporting agency is required to give only rough quantita-

tive estimates of area under the current crop compared with the previous year's crop. The final estimate, on the other hand, is generally based on field to field crop inspection.

Final estimates are, however, themselves subject to revision, if deemed necessary in the light of subsequent information. Such revision, if any, is generally done at the time of release of the estimate of the next year's crop. These revised estimates are called "Partially Revised Estimates", as they might be incomplete for want of some returns from some States. These partially revised estimates are subsequently revised when complete returns are obtained from the States, and these are known as "Revised Estimates."

In preparing final estimates at the State level, in the absence of information in respect of certain areas, generally previous year's figures are used but the extent of these areas is quite negligible in comparison to the total area corresponding to final estimates.

There are certain crops on which crop-cutting experiments are conducted but results are not utilized for framing estimates of food production. The reasons for not utilizing the results are mainly (i) high non-response, (ii) late receipt of returns at the State headquarters, (iii) inadequate coverage, and (iv) high sampling errors.

During 1964-65, about 95 per cent of all-India cereals production and 70 per cent of the all-India pulses production were based on crop-cutting surveys. These percentages in respect of rice and wheat, the two major cereals were 97 and 99 respectively. Among the commercial crops, the percentages of production based on crop-cutting surveys were 76 for groundnut, 71 for cotton, 99 for jute and 79 for sugarcane.

Generally the final forecast estimates include the results of all the crop-cutting experiments conducted 15-20 days before the issue of the final forecast. In the partially revised estimates, the results of crop-cutting experiments received from the field after the preparation of final forecast are also included. The number of experiments on which the estimates are based is practically the same for partially revised and revised estimates.

Tables 18, 19 and 20 give the difference between the various estimates, viz., final, partially revised and revised at all-India level for the years 1959-60 to 1961-62 in respect of rice, jowar, maize, bajra, ragi, wheat and barley. The difference among the various estimates is mostly below 5 per cent.

TABLE 18
 VARIATIONS IN THE DIFFERENT ESTIMATES OF AREA AND PRODUCTION,—FINAL, PARTIALLY
 REVISED AND FULLY REVISED, AT THE ALL-INDIA LEVEL, 1959-60
 (area '000' hectares and production '000' tonnes)

crop	area				production					
	final (f)	partially revised (pr)	revised (r)	$\frac{f-pr}{pr} \times 100$	$\frac{f-r}{r} \times 100$	final (f)	partially revised (pr)	revised (r)	$\frac{f-pr}{pr} \times 100$	$\frac{f-r}{r} \times 100$
Rice	32,918	33,519	33,820	1.79	2.67	29,809	31,460	31,676	5.25	5.89
Jowar	16,836	17,061	17,707	1.32	4.92	7,992	8,132	8,579	1.72	6.84
Bajra	10,805	10,825	10,695	0.18	1.03	3,540	3,576	3,493	1.01	1.35
Maize	4,232	4,332	4,344	2.31	2.34	3,673	4,070	4,073	9.75	9.82
Ragi	2,514	2,414	2,518	4.14	0.16	1,890	1,935	1,986	2.33	4.83
Wheat	12,751	13,169	13,380	3.17	4.70	9,890	10,251	10,324	3.52	4.20
Barley	3,326	3,377	3,378	1.51	1.56	2,647	2,717	2,717	2.58	2.58

Source: Report of the Technical Committee on Crop Estimates, Planning Commission, 1967, p. 122.

TABLE 19
 VARIATIONS IN THE DIFFERENT ESTIMATES OF AREA AND PRODUCTION,—FINAL, PARTIALLY-
 REVISED AND FULLY REVISED, AT THE ALL-INDIA LEVEL, 1960-61
 (area '000' hectares and production '000' tonnes)

crop	area			production						
	final (f)	partially revised (pr)	revised (r)	$\frac{f-pr}{pr} \times 100$	$\frac{f-r}{r} \times 100$	final (f)	partially revised (pr)	revised (r)	$\frac{f-pr}{pr} \times 100$	$\frac{f-r}{r} \times 100$
Rice	33,724	33,567	34,128	0.47	1.18	34,241	35,193	34,574	0.13	0.945
Jowar	17,040	17,273	18,412	1.35	7.45	9,231	9,363	9,814	1.41	5.9
Bajra	11,356	11,424	11,469	0.60	0.98	3,184	3,228	3,823	1.36	16.71
Maize	4,354	4,360	4,407	0.14	1.20	3,978	4,015	4,080	0.92	2.50
Ragi	2,331	2,322	2,515	0.39	7.31	1,663	1,681	1,838	0.89	9.36
Wheat	12,849	12,969	12,927	0.93	0.60	10,819	10,992	10,997	1.57	1.62
Barley	3,204	3,223	3,205	0.59	0.03	2,773	2,866	2,819	3.07	1.45

Source : Report of the Technical Committee, *op. cit.*, p. 123.

Pre-Harvest Estimates

There is a considerable time lag at present between the date of sowing and harvesting of the crops and the availability of crop estimates. Due dates for all-India forecasts have been fixed in relation to the date of completion of sowing and harvesting on an all-India basis. Where the same crop is sown for more than one season, the crop estimate is scheduled to be issued after the second crop is harvested. There is also considerable time lag between the due date of the crop estimate and the date of its release. In some States, the sowing and harvesting operations take place much earlier than in others and it is important that the central Government should get an idea of the estimates of area and production of each of the principal crops in each State as soon as the sowing and harvesting of the crops are completed. Pre-harvest estimates are needed by the trade and Government for policy and administration.

Some of the advanced countries have evolved suitable systems of physical measurements during the various stages of growth of crops for providing reliable pre-harvest estimates. It would, perhaps, be desirable to initiate pilot studies to evolve suitable techniques on the basis of the methods being followed in countries like Japan¹.

We have already examined in the section dealing with area estimates the new scheme for timely reporting of estimates of area which is being implemented in the States of U.P. and Maharashtra. The scheme which is intended to provide valuable information regarding area and production of crops is intended to provide reliable data on crop estimates.

The main feature of the scheme is that a calendar of operations will be drawn up on a monthly basis for each of the principal crops taking into account the sowing and the harvesting operations and on the basis of such a calendar, estimates of area will be reported as soon as the sowing of the crop of the season are completed and estimates of production as soon as the crops of the season are harvested.

It is also intended that the system of collection of agricultural statistics should be re-organized so as to provide independent and timely estimates at the all-India and State levels on acreage and production

1. Cf., R.S. Chada, *Crop Forecasting in Japan, Agricultural Situation in India*, March 1959.

considerably in advance of the current estimates. Such an independent system has also to avoid duplication with the existing arrangements either at the Centre or in the States and has got to be dovetailed from time to time into the existing system. The main features of the new scheme are as follows :

- (i) For each State, a calendar of operations will be drawn up for each of the principal crops.
- (ii) On the basis of such a calendar, the State Governments will be asked to report estimates of area as soon as the crop is sown and estimates of production as soon as the crop is harvested. For this purpose, where the crop is grown in more than one season as in the case of autumn, winter and summer varieties of rice, or kharif and rabi jowar, the crop of each season will be treated as a separate one and separate estimates of acreage and production will be reported.
- (iii) The estimates of acreage will be based on complete enumeration by the field agencies. In case this is not considered feasible, the preliminary estimates of area should be based on pre-harvest sample surveys, selecting one village from each patwari circle and doing complete enumeration in that village immediately after sowing. The final estimates of area under the crops will, however, be based on complete enumeration of acreage in all the villages. Where this is not feasible, particularly in the case of crops of minor importance, they will be in the nature of rough estimates framed in relation to the actual acreage in the previous year and after making allowances for the increase or decrease during the current season.
- (iv) The estimates of production are to be based on crop-cutting experiments carried out during the harvesting time. For this purpose, steps have to be taken to ensure that the crop-cutting returns are dispatched by the primary agencies conducting the experiments to the State headquarters immediately after the conclusion of the experiment and that they are analysed immediately thereafter. Generally there will be one estimate of production based on crop-cutting experiments, for each crop in each season. In the case of cotton where the pickings are spread over time, two estimates of production may be reported one after two pickings are completed, and the other after all pickings are done. In the case of sugar-cane also, two estimates of production may be necessary.

- (v) Where irrigation is important and for crops for which irrigation plays an important role, the estimates of acreage will be given separately for irrigated and unirrigated areas. Similarly separate estimates of acreage will be given for High Yielding and other varieties.
- (vi) The primary reporting agency in the case of area estimates will be the patwari agency. But where the jurisdiction is large, the State Governments may employ the agencies of Panchayat Secretaries for complete enumeration in a part of the patwari circle.
- (vii) The village level-figures will be consolidated by the State authorities. The returns will be compiled at the District or State level either directly from the village level or through successive levels of Kanungo circle and *tehsil*. What is important is that the figures should be received at the Centre within 10 days after the close of the month to which they relate.
- (viii) The agency of Progress Assistants and District Statistical Officers may be utilized for compilation of data and for ensuring that the returns are sent in time to the State Headquarters.
- (ix) The agency for consolidation at the State level will be the crop-reporting agency as at present. But there will be closer liaison between this agency and the Agriculture Department, *i.e.*, with Agricultural Production Commissioner and the Director of Agriculture who are responsible for agricultural production programmes, in the States where such liaison does not at present exist.

National Sample Survey Production Estimates

Just like the acreage statistics, the NSS is also collecting data on the production of various crops. This is, however, restricted to only some major cereals. A comparison between the NSS and official estimates (which are based on crop estimation surveys conducted by State Governments under the overall supervision of NSS) reveals a wide divergence in the two sets of figures even at the all-India level. Table 21 shows the percentage difference in the case of NSS and official estimates of production for all cereals for the last few years. The NSS estimates were higher than the official estimates by 22 to 36 per cent in 1957-58 to 1961-62 and by 8 to 13 per cent in 1962-63 to 1965-66. These differences may be due to the following reasons :

TABLE 21
COMPARISON OF NSS AND OFFICIAL ESTIMATES OF PRODUCTION BY STATES,
ALL CEREALS, 1957-58 to 1965-66.

State	1957-58			1958-59			1959-60			1960-61		
	NSS	official	diffce%	NSS	official	diffce%	NSS	official	diffce%	NSS	official	diffce%
1. Andhra Pradesh	6,792	5,224	30.0	7,735	5,943	30.2	8,482	5,975	42.0	7,453	5,598	33.1
2. Assam	1,769	1,623	9.0	1,452	1,628	(-)	1,847	1,625	13.7	2,538	1,733	46.5
3. Bihar	5,211	3,164	64.7	6,992	5,667	23.4	7,570	5,605	35.1	8,650	6,026	43.5
4. Gujrat	...	...	...	...	...	...	2,791	1,516	84.1	2,973	1,574	88.9
5. Jammu & Kashmir	1,060	350	202.9	1,283	527	143.5	1,281	512	150.2	903	601	50.2
6. Kerala	898	919	(-)	1,026	948	8.2	839	1,031	(-)	1,040	1,057	(-)
7. Madhya Pradesh	5,281	4,960	6.5	9,149	7,187	27.3	8,241	7,136	15.5	10,777	7,598	41.8
8. Madras	4,437	4,389	1.1	5,642	4,275	32.0	5,402	4,600	17.7	6,361	4,701	35.3
9. Maharashtra	12,072*	6,673*	80.9	13,531*	7,772*	74.1	9,451	5,094	85.5	8,225	6,571	25.2

*relates to former Bombay State.

('000' tons)

10. Mysore	4,456	3,224	38.2	4,332	3,361	28.9	4,354	3,519	23.7	5,249	3,399	54.4
11. Orissa	2,934	1,744	68.2	5,399	2,207	144.6	5,183	3,705	39.9	4,743	3,716	27.8
12. Punjab	4,866	3,498	39.1	4,156†	4,011†	3.6	5,534†	4,154†	33.2	4,947	4,132	19.7
13. Rajasthan	3,491	3,234	7.9	5,248	3,555	47.6	5,377	3,552	51.4	6,129	3,250	88.5
14. Uttar Pradesh	9,825	8,292	18.5	13,184	9,300	41.8	13,301	9,421	41.2	14,316	10,256	39.6
15. West Bengal	3,985	4,387	(-)9.2	3,447	4,153	(-)17.0	4,209	4,283	(-)1.7	4,874	5,452	(-)10.6
All-India	68,064	52,180	30.4	82,283	60,830	35.3	83,862	61,856	35.6	90,472	66,340	36.4

†includes Delhi & Himachal Pradesh also.

difference per cent = $\frac{\text{NSS} - \text{official}}{\text{official}} \times 100$

TABLE 21 (Contd.)
COMPARISON OF NSS AND OFFICIAL ESTIMATES OF PRODUCTION BY STATES,
ALL CEREALS, 1957-58 to 1965-66

State	1961-62				1962-63				1963-64				1964-65				1965-66			
	NSS	offi- cial	diffce %		NSS	offi- cial	diffce %		NSS	offi- cial	diffce %		NSS	offi- cial	diffce %		NSS	offi- cial	diffce %	
1. Andhra Pradesh	7,779	6,781	14.7		5,878	5,545	6.0		6,732	6,351	6.0		7,246	6,814	6.3		7,814	5,715	36.7	
2. Assam	2,397	1,755	38.6		2,410	1,512	59.4		2,901	1,833	63.2		2,647	1,896	39.6		2,319	1,834	16.6	
3. Bihar	9,006	6,038	49.2		7,345	5,949	23.4		7,813	6,069	28.7		7,139	6,114	16.8		6,764	5,552	21.8	
4. Gujarat	2,751	2,090	30.7		2,385	1,942	21.6		2,730	2,173	25.6		3,055	2,425	26.0		3,139	2,062	52.2	
5. Jammu & Kashmir	1,006	574	75.2		966	615	57.1		990	582	70.1		956	521	83.5		543	408	33.1	
6. Kerala	779	993	(-)21.6		761	1,080	(-)29.5		948	1,116	(-)15.0		913	1,112	(-)17.9		893	998	(-)10.5	
7. Madhya Pradesh	10,048	7,158	40.4		7,968	6,662	19.6		7,535	7,314	3.0		8,439	7,919	6.6		6,016	4,984	20.7	
8. Madras	5,303	5,077	4.5		5,150	5,034	2.3		4,421	5,073	(-)12.9		4,226	5,179	(-)18.4		3,964	4,678	(-)16.3	
9. Maharashtra	6,736	5,435	23.9		6,815	5,466	24.7		6,450	5,639	14.4		7,099	5,774	33.3		6,037	3,901	55.3	
10. Mysore	4,770	3,526	35.3		3,939	3,672	7.3		3,857	3,792	1.7		3,991	4,033	(-)1.0		2,813	2,875	(-)2.2	

('000' tons)

11. Orissa	4,573	3,720	22.9	3,609	3,670	(-)	1.7	4,683	4,310	8.7	3,776	4,415	(-)	14.5	2,960	3,297	(-)	10.2		
12. Punjab	4,960	4,420	12.2	4,088	4,164	(-)	1.8	3,580	4,571	(-)	21.7	5,440	5,418	0.4	4,879	4,660		4.7		
13. Rajasthan	4,791	4,055	18.2	4,818	3,795		27.0	4,070	3,113	30.7	4,053	4,068	(-)	0.4	3,733	3,053		22.3		
14. Uttar Pradesh	12,249	10,606	15.5	12,019	9,869		21.8	10,517	8,895	18.2	13,070	11,066		21.7	10,627	9,869		7.7		
15. West Bengal	4,535	4,833	(-)	6.2	3,438	4,438	(-)	22.5	4,276	5,346	(-)	20.0	4,968	5,758	(-)	13.7	3,915	4,926	(-)	20.5
All-India	82,852	67,812	22.2	72,571	64,120		13.2	72,242	67,004	7.7	78,712	73,427		7.2	67,808	59,687		13.3		

Difference per cent = $\frac{\text{NSS} - \text{official}}{\text{official}} \times 100$

Source : Report of the Technical Committee, *op. cit.*, p. 59-60.

1. Difference in the shape and size of the cut adopted by the two agencies resulting in border and location bias ;
2. Difference in drriage factors ;
3. Difficulties of harvesting at the proper time with a set of moving investigators in the case of NSS rounds ;
4. Differences in the methods of estimation ;
5. Differences in the amounts of supervision.

The agency employed by the NSS for the collection of such data is also the special set of general purpose investigators who are required to collect data on all types of socio-economic problems like consumer expenditure, population, employment, family planning, capital formation, etc. This agency being peripatetic in nature, might not be considered as quite suitable for crop-cutting surveys. It has been observed that a number of experiments are lost as the investigator is not able to reach the particular village at the time of actual harvest of the selected fields.

Technical Committee on Crop Estimates

The Technical Committee on Crop Estimates, set up by the Planning Commission has called for "all possible measures" to improve the quality and timeliness of the official series of crop estimates.

According to the Committee, no other series could ever replace the official series completely. The measures proposed by it include strengthening of normal departmental supervision on collection and compilation of official statistics, and an intensive, concurrent sample check by a central agency of a sufficiently large scale to provide estimates of crop area and production at State and all-India levels for administrative and policy requirements of the Centre.

It has suggested that on the implementation of this proposal, the present National Sample Survey series of crop estimates should be discontinued.

According to the Committee, an analysis of the weather and crop conditions tended to show that they were more in accord with the trends observed in the official series than those in the NSS series. Again, per capita availability of foodgrains and its annual variation over the period, according to the official series, appeared to be in general conformity with the other independent evidence on availability of grains.

The members of the Committee, excepting the representatives of the Statistical Institute felt, that once the proposal to improve the official series was accepted and implemented, there should be no need to continue the NSS series. The NSS staff, having considerable experience of sample surveys of land utilization and crop-cutting could as well be utilized for the central sample check. Until the sample check was established, the NSS series might continue.

Comparability of Production Data Over Time

The figures of area and production published from year to year are not strictly comparable due to changes in the coverage and method of estimation. Variations in the coverage since 1949-50 have, however, been small and, therefore, do not affect much the comparability of acreage data since that year. The improvements in the method of estimation of the rates of yield and total production were introduced mainly after 1949-50, especially in the case of food-grains and have thus introduced an element of non-comparability in the estimates for the past and the present.

As early as 1953, the Ministry of Food and Agriculture took steps in consultation with the Central Statistical Organization to compile index numbers which would correctly indicate the relative change in the production of different crops over a period of years even though it was not practicable to maintain the comparability of absolute figures over such a period. This scheme of index numbers with the base year as 1949-50 was published in July 1954. Index numbers of area under crops, agricultural production and productivity (yield) are now being constructed by the chain base method by linking the figures of each year with those of 1949-50 through pairs of comparable figures for each two successive years.

In the construction of index numbers, the fact that for any two consecutive years comparable figures of production are always available under the existing system of crop estimate is made use of to get a reliable estimate of the relative changes in the volume of production of individual crops, important groups of crops like cereals, oilseeds, fibres etc., and also for the total agricultural production taking all the commodities. For example, for the year 1956-57, the final estimates of production released would also give comparable revised figures for 1955-56. These two sets of figures have the same coverage and are based on the same method of estimation for any individual State (or sometimes region). Therefore, these figures give a correct estimate of

the percentage change in 1956-57 over 1955-56 in the production of individual crops or groups of crops. Similarly the relative position of 1955-56 in regard to 1954-55 is already known on the same basis.

Working backwards, therefore, the relative production of each crop with 1949-50 taken to be 100 can be correctly determined. Such an index is called the production relative of the crop. These production relatives for individual crops are utilized for the preparation of group indices like the index of production of cereals, index of production of foodgrains, and also the general index of agricultural production with the weights already assigned to individual commodities and groups. Such an index number gives a fairly reliable idea of the increase in production.

These two sets of figures (Index Numbers and Absolute Production figures) have two distinctive uses. The absolute figures of output are required for economic planning, for estimation of national income and for the analysis of agricultural production. These figures are an indication of the absolute quantity of output for purposes of determining the annual availability of various commodities. That way the figures are used for policy purposes. They are primarily, not exclusively, of topical interest, that is for the particular year they relate to. Index numbers, on the contrary, provide the indication of output trends over time.

In any study of the trends of agricultural production, the correct procedure according to the explanation given above would be to compare the figures given in a particular crop estimate for the current and the previous year and to use the index numbers for making comparisons over any longer period. In view of many changes in the coverage and methods of yield determination even the index numbers have limited comparability over long periods and cannot serve the purpose of historical series. Quantitative measurement of the increase in production of 'Principal crops',—taking into account the improvements affected upto the year 1960-61, prepared by the Directorate of Economics and Statistics, Ministry of Food and Agriculture is given in Appendix 10.

Statistics of Inputs

SOME of the important means of production which help to raise yields can be classified as follows :

1. Irrigation ;
2. Fertilizers/manures ;
3. Improved seeds ;
4. Pest control measures ; and
5. Improved methods of cultivation.

But for irrigation, data on other aspects as mentioned below are rather scanty and unreliable.

Irrigation

Irrigation statistics are collected along with the land utilization statistics. All-India statistics are now available for the following :

1. Net area irrigated, source-wise.
2. Gross area irrigated (source-wise break-up not available).
3. Distribution of gross irrigated area among various crops.

They are published in the *Indian Agricultural Statistics*. Its Volume I provides State totals, while details up to the District level are provided in Volume II. Formerly, irrigation data were also

published in two Reviews, namely, *Review of Irrigation in India* and *Triennial Review of Irrigation in India*.

Information in these Reviews pertained to total area irrigated by Government works, the number of wells in actual use and the area irrigated therefrom and the number of wells not in use in respect of British Indian Provinces only. These Reviews have been discontinued. The former Department of Works, Mines and Power issued statements showing financial results of productive and unproductive irrigation, navigation and drainage works. No such statements have been published after 1945-46.

Some data regarding the results of operation of irrigation, navigation, embankment and drainage works are published in an abstract form in the Statistical Abstract, based on the returns received from State Governments and the "Combined Finance and Revenue Accounts of Central and State Governments of India."

'Statistical Abstract,' an annual publication of the Central Statistical Organization provides information about the results of operation of productive and unproductive irrigation works in the States. The details cover the following items :

1. Mileage in operation—main canals and branches, and distributaries.
2. Area of land irrigated during the year.
3. Total capital outlay (direct and indirect).
4. Gross receipts.
5. Working expenses.
6. Net revenue.
7. Interest on mean capital outlay.

This abstract also provides details of operations of irrigation and navigation works and gives figures of gross revenue from all sources, gross revenue per acre irrigated and the total value of crops irrigated.

The Central Water and Power Commission, Ministry of Irrigation and Power also brought out a publication entitled *Irrigation Statistics of India* in 1954-55. It is not a regular feature. The 1954-55 issue is the first and the latest available at present. It is understood from the Commission that they are preparing another similar volume to bring the data up to date in a revised edition.

It provides detailed information on all the major and medium irrigation works, about their operation as well as construction. All the projects have been distributed between the various States and for each one of them Information is given on each Project on cost, source of water, year of commencement and completion, mileage of canals and branches, catchment area, average annual run off, water spread area of lake, full reservoir level, live storage, length of dam, maximum height, discharge of canal at head, duty and annual rainfall.

Information is also provided about the kind of soil in the irrigation boundary, gross commanded area, culturable commanded area, intensity of irrigation, cost of project per area, crop patterns, per cent of gross area irrigated, cost of project per acre of gross area and rate of return on capital investment.

Section II deals with current water rates—State and crop-wise. Section III gives detailed information about the rates of betterment levy, State and project-wise. Section IV is a summary of the net and gross area irrigated from 'Agricultural Statistics.' The other sections deal with,

1. Progress of expenditure on capital irrigation works from 1947-48 to 1953-54.
2. Gross income, working expenses, net revenue and direct receipts—all per acre of irrigated area.

Lacuna in Existing Data

Like other area statistics, the statistics of irrigated area by source and crops, flow as a bye-product of the land records prepared primarily for land revenue purposes. Naturally, the reliability of these statistics depends on the extent to which the particulars of irrigation are systematically and distinctly recorded at the field level and correctly aggregated at the village level and higher levels. Further, inter-State comparability of irrigation statistics is vitiated because of lack of uniform concepts and definitions and standard classification regarding irrigation particulars in the records.

Besides this, there are still gaps in the irrigation statistics. Distribution of gross irrigated area as between the sources of supply, length of irrigation canals—Government and private, number of wells, tanks, etc., are not known at present. Some of the State Governments publish some figures about the number of wells and tanks, etc., at

periodical intervals in their Season and Crop Reports and the Administration Reports of the Departments of Irrigation and Public Works. Since there is no supervision over the collection of such data by the primary agency—the Patwari—it is very difficult to rely on the information given by some of the States.

The definitions and concepts either on all India basis or in some cases even in the same State, have not been uniform over a period of time. In Madhya Pradesh, for example, figures for both Government canals and tanks were shown under private canals up to 1948-49. In Uttar Pradesh, figures shown under Government canals include those under private canals, except for the Districts of Basti, Budaun, Dehradun and Nainital for which separate figures in respect of areas irrigated by private canals are given.

In West Bengal, Bihar, Orissa and parts of Madras and Uttar Pradesh, the figures for areas irrigated by sources other than Government canals are only rough estimates. The figures for Assam and Coorg have been incomplete for a long time. Figures for wells in U.P. include those for tubewells. The definition of tanks is not uniform in the different parts of India.

Potential and Actual Irrigation

Various Plan documents provide figures about the irrigation potential created and utilized during the previous plan period based on data furnished in the Progress Reports of Irrigation Departments of the State Governments. These calculations are not made from any field enquiry, but are invariably based on the amount spent, particularly in the case of minor irrigation. Then figures are generally additions and subtractions during the various Plan periods over the irrigation coverage before the First Plan. The land utilization statistics including irrigation are made available usually after a time lag of three years. This adds further to the difficulty of finding out the exact position at any point of time.

Figures regarding the utilized potential as given in the Plan are invariably on the higher side. This may be attributed to :

1. A long time gap between the completion of major irrigation works and the use of irrigation water actually.
2. Not accounting for minor irrigation works going out of use.

3. Double counting in the case of minor irrigation works coming under the command of major irrigation works.
4. Similar double counting of irrigation targets. Major portion of the country has been covered by the community development organization. There are separate targets fixed for minor irrigation under the Community Development and Agriculture Departments. There is every possibility that wells or tanks constructed by one organization are also counted by the other.
5. False reporting of the completion of irrigation works. It is also possible that wells and tanks claimed to have been constructed and water therefrom utilized might not have come into existence at all. An enquiry conducted by the Reserve Bank in some of the selected Districts of India, supports this statement.

Future Requirements

More comprehensive data on irrigation are no doubt needed. Some of the important aspects on which there is need to have more information are :

1. The figure of total irrigation potential of 100 million acres from major/medium irrigation projects and 75 million acres from minor projects as given in the Third Plan,¹ has no scientific basis behind it. There is an immediate need to undertake regular surveys for finding out the total irrigation potential of the country and locating the areas where such irrigation (major or minor) would be possible.
2. No information is at present available with regard to the distribution of double cropped irrigated/unirrigated area as between the various crops. Such information is very useful in planning irrigation development.
3. In addition to statistics of physical areas under irrigation, there should be information on the adequacy and timeliness of irrigation services according to the needs of farming. There should be a proper analysis of data such as volume of water, area of crops irrigated, rainfall, etc. to show that the irrigation service is adequately fulfilling its main objectives.

1. This figure has now been raised to about 200 million acres.

4. *Drainage is akin to irrigation. We have no precise data regarding areas/crops affected by water-logging. Just like the irrigation plans, data with regard to drainage plans should also be collected and published.*

Fertilizers

Distribution. Before 1966 nitrogen distribution was a government-cum-co-operative monopoly. Phosphate distribution was handled by the manufacturers through private dealers and co-operatives. The limited quantities of potash, which had all to be imported, were distributed either by IPSA¹ through private dealers and co-operatives or by the Pool² through co-operatives. As a rule, co-operatives showed a disinclination to distribute superphosphate except in those States where they were protected from competition by the exclusion of private dealers. Some of this disinclination was no doubt due to storage problems arising out of bag rot caused by the free acid in superphosphate.

In December 1965, the Government of India announced that new fertilizer projects, which were licensed before 31st March, 1967 (later extended to 31st December, 1967) would be given freedom to market their products through agencies of their choice, in places of their choice and at prices to be determined by them, for a period of seven years from the date of starting commercial production. A proviso was added to the effect that Government would have the right to take up for its own distribution 30 per cent of the factory's production at prices to be negotiated with the factory.⁴ This marketing relaxation was extended to existing factories also in a phased manner; they were allowed to sell under their own arrangements 30 per cent of their production in the first twelve months from 1st October, 1966, 50 per cent from 1st October, 1967 and 100 per cent, subject to Government's option of 30 per cent, from 1st October 1968. It should be noted that these phased arrangements related only to straight nitrogenous fertilizers. Factories have always been free to market their complex fertilizers as they pleased. So far as the Central Government is concerned, superphosphate manufacturers have always enjoyed marketing freedom. As regards pricing, Government was fixing the ex-factory maximum prices of superphosphate under an informal agreement

1. Indian Potash Supply Agency.

2. Central Fertilizer Pool—a Trading Agency of the Central Government.

with the manufacturers. The responsibility for setting superphosphate prices was transferred in May 1966 by the Government to the Fertilizer Association of India.

Data on Fertilizers. *Fertilizer Statistics*—a publication of the Fertilizer Association of India—supplies data on the consumption of fertilizers upto the State level¹. The Agriculture Departments of the various State Governments also have information about the consumption of fertilizers in the various districts, but the same is not published. There is the need to make this valuable data available at the District level, particularly at this time when the 'Green Revolution' is on.

In addition to information available on production, imports, exports and distribution of various types of fertilizers published in the *Fertilizer Statistics*, it is desirable to develop information on the quantity of fertilizers being applied to different crops. Some data regarding the quantity of fertilizers used and area fertilized is being collected in respect of some commodities like cotton, but the data are not quite reliable. Surveys on a sampling basis should be undertaken to get this information.

Organic Manures

There is no accurate estimate of either the quantity of organic manures used or acreage benefited from it. Some data were collected

TABLE 22
ESTIMATED COST OF MANURES ACCORDING TO
DIFFERENT SOURCES

Source	Year of reference	Value of manure (all kinds) Rs. per acre
1. Farm Management Survey Reports	average of three years	
(a) cost accounting method	1954-55 to	5.18
(b) survey method	1956-57	12.90
2. NSS Report No. 32 (Survey method)	average of 1951-52 and 1952-53	4.38
3. Rural Credit Survey Report	1951-52	6.59

Source : National Income Statistics, *op. cit.*, p. 43.

1. Appendix 11 provides information about production, imports and distribution of fertilisers in India and Appendix 12 Statistics regarding distribution of N.P.K.

by the NSS about the cost of cultivation and published in their Report No. 32. The data pertain to the census regions of the country. Similar information was also collected by the Rural Credit Survey and the Farm Management Survey Reports. Table 22 summarizes the results obtained on the basis of these three sources.

The information already collected by the surveys gives a rough idea, but it has little utility for micro or even macro type of planning. The Directorate of Economics and Statistics is collecting some information regarding the compost pits dug and compost prepared by big *panchayats* as well as municipalities as part of 'Grow More Food Campaign Statistics.' The Plan documents which use this data publish the achievements in respect of urban and rural compost State-wise.

The 'Indian Agricultural Statistics', provide information about the area 'green manured for each District in the country. These figures, however, differ widely from those released by the Plans.

If such data are to be of any practical utility, one should know not only the absolute quantity, but also the type and quality of the organic manure being applied to various crops in different parts of the country. The need is to have a crop-wise data about the application of various organic manures. There is also the need to express the quantity of manure applied in some uniform unit, which is properly defined¹.

Sample Surveys for a Study of Manuring

The ICAR has been carrying out sample surveys on fertilizers and other manuring practices in selected districts in various States during the previous Five Year Plans. The broad objective of the surveys is to estimate crop-wise consumption of different fertilizers and manures, area benefited therefrom, rates of application, associated agricultural practices, etc. Such information is useful in studying how the practices adopted by the farmers differ from those recommended by the agriculture departments for increasing agricultural production. It also enables the authorities responsible for developmental activities to observe what changes are taking place in the cultivation practices over the years and what steps may be taken for further progress. It is also useful in formulating realistic targets for fertilizer consumption.

1. Data quite often given in cart loads varies in its size and weight from area to area.

In the light of the changes taking place in agricultural technology, it is necessary to widen the scope of the Surveys. The objective of the proposed Survey during the Fourth Five Year Plan would, thus, be to collect representative data on farming practices adopted by the progressive cultivators and other cultivators in areas where the spread of high-yielding varieties has made a considerable headway. So far such surveys have been completed in 14 Districts and are going on in 3 more Districts. It is proposed to conduct studies in 15 more Districts upto 1970-71. The Districts to be selected will be those where high-yielding varieties of rice, wheat or millets have been appreciably patronised. In the last two years of the Plan, Surveys are proposed to be undertaken in 6 Districts to study farming practices in those river valley areas where multiple cropping patterns are adopted by cultivators.

Improved Seeds

In the case of improved seed distribution, detailed account is available in respect of the stores run by Government or co-operatives in the States. Statistics are not very dependable about the 'natural spread' of the improved seed. Natural spread refers to the area the supply of which has been planted with improved seed obtained by the farmer either by storing his own selected seed or from sources other than government or co-operatives.

The seed released from the stores is not always up to the standard. Therefore, the data based on these sources do not give a true picture of the area under improved seeds. There is also a possibility that all the seed so distributed is not used for planting.

During the Second Plan, it was decided to set up seed farms—one in each block to produce quality seed sufficient to saturate the total cropped area of the block. Subsequently the idea of block seed farms was changed into that of big farms and seed villages. Effort were made in the Third Plan to implement these schemes. The National Seeds Corporation was then established in 1963 mainly as a foundation of seed production, stocking and supply organization for hybrids, particularly of maize. The Corporation is now dedicated to the task of providing high-yielding varieties of seeds to the farmer. An indication of the expansion in the activities of the Corporation is given in Table 23.

TABLE 23
SEED PRODUCTION PROGRAMME OF THE NATIONAL
SEED CORPORATION

'00' acres

Year	Foundation seed production	Certified seed production	Hybrid crop seed
1963-64	2	16	1150
1966-67	38	511	7500
1967-68	58*	1170	55,110
1970-71	83†	2610	195,000

*Estimates.

†Targets.

The production of cotton seed for seed multiplication and distribution in various States is well organized to ensure its purity and quality.

Coverage by Improved Varieties

There seems to be considerable scope in regard to the improvement of the system of collection of data for acreage under improved varieties of crops. At present, the assessment is made by the Department of Agriculture through their subordinate officers. The Director of Agriculture collects this information from the Divisional Deputy Directors of Agriculture who in turn compile the information received from the various District Agriculture Officers. The District Agriculture Officer bases the figures on the information supplied by the Agriculture Officers in the Blocks and Agriculture assistants in the non-Block area. Acreage figures are calculated on the basis of improved seed distributed in different areas. The total area of distribution is calculated on the basis of average seed rate per acre. Natural spread of the improved varieties is also taken into account, the assumption taken being¹ :

1. Paddy and Jowar. Five times the area covered by direct distribution.

1. Report of the Committee on Plan Projects, Survey of Coverage by Improved Varieties—Madhya Pradesh, Planning Commission.

2. Wheat and Gram. Three times the area covered by direct distribution.
3. Other crops. Four times the area covered by direct distribution.

No information is collected for the area under different varieties.

It is apparent that the procedure adopted for the determination of the area under improved varieties of crops cannot be considered as satisfactory. In the first place, it cannot be taken that all the seed which has been distributed, was used for sowing. Secondly, the assumption in respect of natural spread is hypothetical. Unless, therefore, the information is collected on the basis of adequate random sampling, much reliance cannot be placed on the figures. To start with, the Team¹ recommends that a pilot survey for the assessment of coverage of improved seed by random sampling in Raipur and Bilaspur Divisions for rice and Bhopal and Indore for wheat may be taken up. Besides the collection of information from the cultivators, samples of seed should also be taken from the standing crops, threshing floors, stores, etc., for conducting check tests for germination, purity and weed seeds and other crop contents and disease or pest infection etc. With the introduction of High Yielding Varieties of seeds, the importance of data on seeds has become all the more important.

Pest Control Measures

The existing data on pest control measures are those released by the Plan documents and the important Commodity Committee Bulletins. The Grow More Food Statistics, portions of which are published in the *Abstract of Agricultural Statistics*, also give the area covered by pest control measures. The reliability of these statistics is a little better than that of the area covered by improved seed.

Besides the data on pest control measures, there is also the need to have regular information about the areas affected by pests and diseases. No such data are being collected at present on an all-India level.

Land Improvement Measures

Land improvement measures comprise (a) reclamation, and (b) bunding and soil conservation measures. Land reclamation

1. *Ibid.*

operations on an extensive scale have been carried out in the post-Independence period by the Central Tractor Organization and State Tractor Units.¹ Since these operations were being performed under the auspices of Government, complete statistics of the area reclaimed, both under prior fallow and prior cultivated lands, are available.

Private efforts in the field of land improvement, however, generally go unrecorded. The assumption made is that land improvement works undertaken privately are not significant.

Improved Cultivation Practices

Improved cultivation practices relate to methodological changes in field operations like line sowing, transplanting, inter-cultural operations, etc. Difficulties in the collection of data on improved practices are still greater.

The Plan documents and some of the Commodity Committee Bulletins give casual references of the total area covered under improved cultivation practices. Data on line-sowing and Japanese method of cultivation in the Community Development areas are maintained at the Block Headquarters. A publication, *Rice Economy of India, 1961*—gives figures of area under the Japanese Method of Rice Cultivation for the years 1953-54 to 1958-59. Such data are also scarce and quite unreliable.

1. These organizations have since been closed.

9

Livestock Statistics

THE SYSTEM of holding regular cattle censuses on an All-India basis was initiated in 1919-20 and 10 enumerations have been held since then. None of these censuses covered the whole of the country at one time and even the areas of enumeration have not been the same in all the cases.

Attempts are said to have been made in the Moghul period to take a cattle census but it was only from the eighties of the nineteenth century that any regular census system was initiated. The work was first taken up in certain Districts of the Punjab and later in Bengal and other British provinces. In most parts, the statistics were collected annually. They were collected neither at the same time nor were the methods of enumeration uniform throughout the country. With a view to standardize the methods of collection and to make the data comparable and more useful, the Government of India decided in 1916 that a cattle census should be taken throughout British India during the cold weather of 1919-20 and that this census should be repeated quinquennially thereafter.

First and Second Census

The first census was accordingly held from December, 1919 to

April 1920 throughout British India.¹ The co-operation of Indian States was also invited and 28 of them comprising about 29 per cent of the total area of Indian States joined. The second census was taken in 1924-25, when 12 more Indian States participated, bringing the total area covered to about 38 per cent but the coverage was still incomplete.

Third Census

One defect in the above two censuses was that the period of enumeration was too long, *viz.*, from December to April. Large inter-provincial movements of cattle are known to take place during these months and the results were vitiated to some extent for this reason. In 1928, the Royal Commission on Agriculture recommended that the census should be taken simultaneously all over the country in as short a period as possible so that the results are more accurate and reliable. Accordingly, the third census was taken in January, 1930, when all the British Provinces and 83 Indian States joined, covering about 50 per cent of the total area of the Princely States.

Fourth and Fifth Census

The fourth census was taken in January, 1935. The Provinces of Bengal, Bihar and Orissa did not participate in this census mainly owing to financial reasons. A large number of Indian States, however, participated and about 66 per cent of their total area was covered, as compared with about 50 per cent in 1930. The fifth census was held in January, 1940. The United Provinces and Orissa could not join this time but the number of Indian States which took part in it increased and nearly 79 per cent of their area was covered.

In the censuses of 1919-20, 1924-25 and 1929-30, the oxen and the buffaloes were, for purposes of enumeration, divided into four groups, *viz.*, bulls, bullocks, cows and young-stock. The last group included animals not old enough for work or breeding. With a view to obtaining more complete information, the following revised classification was adopted for the 1935 census :

Males—

1. Breeding bulls, *i.e.*, entire males over 3 years kept or used for breeding purposes.

1. The census in British Baluchistan was taken in 1920-21.

2. Working bullocks, i.e., bullocks and uncastrated males over 3 years kept for work only.
3. Bulls and Bullocks over 3 years not in use for breeding or work.
4. Total bulls and bullocks...

Females—

1. Breeding cows, i.e., cows over 3 years kept for breeding or milk production.
2. Cows over 3 years used for work.
3. Cows over 3 years not in use for work or breeding purposes.
4. Total cows...

Young-stock—

1. Under one year male and female.
2. One to three years of age—male and female.
3. Total young-stock.

A slight departure from the above classification was made by the United Provinces in submitting its returns. Several of the Indian States also adhered to the old classification.

* In the 1940 census, breeding cows were further subdivided into : (i) in milk, (ii) dry, and (iii) not calved. Another feature of this census was that enumeration was done separately for rural and urban areas in each District. All the Provinces and States participating in the census did not, however, follow the new classification. In Bihar and in some of the States, the 1935 groups were adhered to and no census was taken separately for urban and rural areas. In some cases, viz., Bikaner State, the enumeration was done in 1938-39 instead of in 1940.

Sixth and Seventh Census

The sixth census was taken in 1945 when 92 per cent of the States participated. On the partitioning of the country in 1947, Sind, Baluchistan, N.W.F.P., and parts of Punjab, Bengal and Assam were transferred to Pakistan, thus resulting in a large-scale transfer of both human and cattle population.

The seventh livestock census in the series and the first official one for the Indian Republic was held in May, 1951. With a view to ensure uniformity of concepts and in order to make the data comparable, the Central Government prescribed for the 1951 census a uniform

proforma for the first time and also issued detailed instructions to the States for carrying out this census. Actually some improvements were made in the original proforma and some additions were also made in the classification of animals. This classification which has remained unchanged since then is shown in Appendix 13.

At the Centre, the Office of the Director General Commercial Intelligence and Statistics was performing the duties of co-ordinating the work relating to livestock census till 1945. This work was taken over by the Directorate of Economics and Statistics. The coverage in this census increased to 94.6 per cent. The rural and urban break-up under each of the classification was given for the first time in 1951.

Eighth Census

The second for the Indian Republic and the Eighth Livestock Census in the series was held in 1956. Important improvements effected in the census over the previous ones are as follows :

- (i) In most of the States, a number of departments were associated with the census. For the smooth conduct of the census and for expediting the final compilation, etc. ; the responsibility for the conduct of the Census was entrusted to one officer in each State. Officers-in-charge of the census were also designated for lower administrative units, *e.g.*, district, taluka, municipality and forest area.
- (ii) A conference of livestock census officers was held in August, 1955 to finalize the arrangements for different operations connected with the census and to consider ways and means of improving the quality and content of the data.
- (iii) A 'Census Calendar' was drawn up for carrying out the different operations which included, among other things—
 - (a) training of enumerators prior to actual enumeration.
 - (b) preparation of list of households.
- (iv) The enumeration was done on a household basis for the first time.
- (v) Rationalized supervision of the primary enumeration was carried out on a random sampling basis for the first time.
- (vi) A sample verification survey was conducted, for the first time, by the Directorate of NSS in June-July, 1956 at the instance

of the Ministry of Food and Agriculture in order to check the accuracy of the census data.

- (vii) The district abstract statements containing information on broad categories of livestock were obtained for the first time direct from the districts immediately after the census enumeration work was over. On the basis of these figures the provisional all-India totals of livestock numbers were released after 5 months of the conduct of the census.
- (viii) Each State Government was required to bring out a State Livestock Census Report more or less on the lines of the all-India report but containing tehsil-wise information on the number of livestock, agricultural machinery, etc.
- (ix) Government of India gave financial assistance to the States towards meeting the additional cost of the census on an improved basis.
- (x) For the first time, the census was conducted simultaneously throughout the country except in Orissa, West Bengal and Manipur.

Ninth and Tenth Census

The Ninth Census was held with April 15, 1961 as the reference date. This was arranged to coincide with the Population Census, 1961. A Census Calendar was drawn up for ensuring the completion of various operations connected with the censuses according to schedule. Provision was also made for a rationalized supervision of 5 per cent of the villages/urban areas to be selected at random. In the selected villages, 10 per cent of the households were selected by systematic sampling with a random strata. Supervisors were also given proper training.

The proforma and instructions adopted in the census were essentially the same as those adopted during the 1956 Livestock Census except for the following :

- (i) In the case of cattle and buffaloes, the classification, "males over three years" was enlarged.
- (ii) Provision was made for the enumeration of "yaks" in States where these are found.
- (iii) Age classification was introduced for mules.

The Tenth Quinquennial Livestock Census was conducted in 1966 with 15th April, 1966 as the date of reference except Jammu and Kashmir, on an improved basis by the States to collect data on the number of livestock and poultry, agricultural implements and machinery and fishing crafts and tackles. Information in respect of Goa, Daman and Diu and NEFA has not become available so far. A number of additional items were included to make the Census comprehensive. For improving the quality of census enumeration, a scheme of rationalized supervision was carried out in 5 per cent of the rural and urban areas besides the normal administrative supervision. In addition to rationalized supervision, a Post-Enumeration Sample Survey of the 1966 Census has been conducted to provide data on additional items like age-composition, breed, immunization against rinderpest, average lactation period and average calving interval etc. Provision has also been made to collect data on fishing crafts and tackles. Basic results of the Census are given in Table 24. Appendix 14 gives details for the same.

Frequent changes in the classifications, the adoption of different groupings by some units and participation of some areas in one census and non-participation in the other affect the utility of livestock census figures and make comparisons on all-India basis difficult. Besides, the data in many parts are at present collected through village chowkidars, headmen, policemen, etc. and are not always free from inaccuracies.

TABLE 24

TENTH ALL-INDIA LIVESTOCK CENSUS, 1966¹
ABSTRACT STATEMENT OF LIVESTOCK, POULTRY, TRACTORS
AND FISHING TACKLES

				(Number)
S. No.	Item	1966-Census	1961 Census	Percentage increase (+) or decrease (-) of col. 3 (over col. 4)
1.	CATTLE			
	(a) Males over 3 years			
	(i) Used for breeding only	433,037	364,226	
	(ii) Used for breeding and work both	2,251,423	1,964,242	(+) 1.1
	(iii) Used for work only	69,144,615	68,703,615	
	(iv) Others	1,464,333	1,496,019	(-) 2.1
	TOTAL	73,293,458	72,528,102	(+) 1.1

<i>S. No.</i>	<i>Item</i>	<i>1966—Census</i>	<i>1961—Census</i>	<i>Percentage increase (+) or decrease (—) of col. 3 over col. 4</i>
<i>(b) Females over 3 years</i>				
<i>(i) Breeding</i>				
	<i>(a) In milk</i>	20,965,219	20,666,588	(+) 1.4
	<i>(b) Dry</i>	25,797,296	25,016,579	(+) 3.1
	<i>(c) Not calved even once</i>	4,991,514	5,318,580	(—) 6.1
<i>(ii) Working</i>				
		1,982,303	2,150,035	(—) 7.2
<i>(iii) Others</i>				
		928,765	1,052,120	(—) 11.7
	TOTAL	54,665,096	54,203,902	(+) 0.9
	<i>(c) Youngstock</i>	48,028,311	48,825,063	(—) 1.6
	Total Cattle	175,986,865	175,557,067	(+) 0.2
2. BUFFALOES				
<i>(a) Males over 3 years</i>				
<i>(i) Used for breeding only</i>				
		329,656	291,445	
<i>(ii) Used for breeding and work only</i>				
		620,419	493,221	(+) 6.6
<i>(iii) Used for work only</i>				
		6,972,835	6,644,750	
<i>(iv) Others</i>				
		268,672	253,734	(+) 5.9
	TOTAL	8,191,582	7,683,160	(+) 6.6
<i>(b) Females over 3 years</i>				
<i>(i) Breeding</i>				
	<i>(a) In milk</i>	12,908,776	12,462,977	(+) 3.6
	<i>(b) Dry</i>	10,434,733	9,495,807	(+) 9.9
	<i>(c) Not calved even once</i>	2,148,171	2,279,298	(—) 5.8
<i>(ii) Working</i>				
		385,372	486,897	(—) 20.9
<i>(iii) Others</i>				
		244,900	297,444	(—) 17.7
	TOTAL	26,121,952	25,022,423	(+) 4.4
	<i>(c) Youngstock</i>	18,562,407	18,502,339	(+) 0.3
	Total Buffaloes	52,875,941	51,207,922	(+) 3.3
3. SHEEP		42,010,408	40,223,270	(+) 4.4
4. GOATS		64,548,624	60,864,026	(+) 6.1
5. HORSES AND PONIES		1,148,256	1,326,879	(—) 13.5
6. PIGS		4,972,730	5,176,210	(—) 3.9
7. CAMELS		1,027,084	902,881	(+) 13.8
8. OTHER LIVESTOCK		1,156,793	1,173,505	(—) 1.4
9. TOTAL LIVESTOCK		343,726,701 ²	336,431,760	(+) 2.2
10. POULTRY		115,070,942	114,253,577	(+) 0.7
11. TRACTORS		53,9683	31,016	(+) 73.5
12. FISHING BOATS		196,247	N.C.	—
13. FISHING AND CARRIER BOATS WORKED BY POWER		11,494	N.C.	—
14. FISHING NETS		2,910,580	N.C.	—

1. Reference data for the Census is 15th April, 1966.

2. Livestock census 1966 figures exclude data for Goa, Daman and Diu and Nefa from which data have not been received so far.

3. Includes 127 Tractors in respect of Goa, Daman and Diu for which Livestock census 1966 data are not available.

Note. 1. All India figures given in this table may not tally with all-India totals to be arrived at on the basis of State figures as the data in respect of some of the States have undergone changes.

2. The figures are purely tentative and subject to revision.

3. N.C.—Not collected.

Livestock Products

Although data on livestock numbers for the various categories are almost exhaustive, there are as yet, practically no reliable statistics available with regard to livestock products. Pilot sampling investigations were carried out during Second and Third Plan periods on principal livestock products in typical tracts of the country for evolving suitable sampling techniques for estimates of annual output of these products and studying the livestock practices. Such studies provided suitable sampling techniques for estimating the products individually. These techniques are now being used by the States like Uttar Pradesh and Rajasthan for estimating production. It is proposed to carry out these research investigations under the guidance of ICAR in eight states during the Fourth Five Year Plan period. The existing position in respect of various livestock products and the procedure adopted by the National Income Unit of the Central Statistical Organization are explained below. The livestock products are divided into the following categories :

1. Milk and its products.
2. Meat, edible offals and other by-products.
3. Hides and skins.
4. Wool, hair and bristles.
5. Eggs and poultry meat.
6. Bones, horns, hoof, etc.
7. Dung used for purposes of fuel, manure and other domestic uses.

Table 25 shows the production of livestock commodities during 1959-60

Milk and its products. The total production of milk is obtained by multiplying the average milk yield rate per breeding animal with the total estimated number of breeding animals. The formula adopted for the purpose is as follows:

- (a) average lactation yield = $\frac{\text{average daily yield} \times \text{average lactation period}}{100}$
- (b) average annual yield (per animal kept for breeding or milk production) = $\frac{\text{average lactation yield} \times \text{percentage of animals in Milk}}{100}$
- (c) total milk production = $\text{average annual yield} \times \text{number of animals kept for breeding or milk production}$

The number of breeding animals of all types are obtained from the livestock census data and the milk yield rates are based on the *ad hoc* surveys conducted by the Directorate of Marketing during the course of preparation of their Reports on the Marketing of Milk. Such Reports are available for the Indian Union for the years 1941 and 1950.

TABLE 25

PRODUCTION OF LIVESTOCK COMMODITIES : ALL INDIA

('000' metric tons)¹

	1955-56	1956-57	1957-58	1958-59	1959-60
1. MILK					
1. Milk consumed as such					
(a) rural	7331	7373	7415	7457	7500
(b) urban	360	363	365	368	370
2. Ghee ²	431	433	436	439	442
3. Dahi ²	1539	1546	1553	1559	1565
4. Butter ²	81	82	82	83	83
5. Lassi ²	6990	7030	7071	7712	7152
6. Other products ³	1192	1192	1202	1207	1212
2. MEAT					
1. Beef ³	67	67	67	67	68
2. Buffalo ³	96	98	99	100	102
3. Sheep ³	130	130	131	131	131
4. Goat ³	255	260	264	269	274
5. Pork ³	25	25	26	26	27
6. Head and legs	80	81	82	83	84
7. Animal fats ⁴	29	30	30	30	31
3. HIDES AND SKINS					
1. Cattle hides	156	156	157	157	158
2. Buffalo hides	52	52	52	53	53
3. Goat skins	281	287	292	298	303
4. Sheep skins	152	153	153	153	153
4. POULTRY AND EGGS					
1. Poultry	1378	1413	1445	1478	1512
2. Eggs : hens	136	140	145	149	154
ducks	27	27	28	28	28
others	3	3	3	3	3

(Continued)

	1955-56	1956-57	1957-58	1958-59	1959-60
5. WOOL AND HAIR					
1. Wool	30639	31300	31962	32629	33298
2. Goat hair	3784	3969	4150	4334	4516
3. Camel hair	387	399	413	426	439
4. Pig bristles	287	292	297	303	308
6. DUNG CONSUMED					
1. As manure	223	224	225	226	227
2. As fuel	99	100	100	101	101
3. For other purposes	25	25	25	25	25
7. BONES	138	138	139	140	141

1. With the exception of hides and skins, eggs and poultry where the production is in lakh numbers, wool and hair where the production is in metric tons and dung where the production is in million metric tons.

2. Milk equivalent.

3. Includes edible offals.

4. Excludes fat which is sold along with meat.

The estimates made by the Marketing Directorate are not based on any scientific method, no reliance can be placed on them. Even these estimates are not available on annual basis.

This method does not obviously take into account any changes or improvements in the production of milk. Secondly, the formula as referred to above, will give a wrong idea of the total production of milk in the country if there is any change in the proportion of animals in milk to total female breeding animals in the inter census years. Although the proportion of animals in milk to total breeding animals showed a fair degree of consistency for the years 1940, 1945, and 1950, this changed appreciably for the 1956 census due to a change in the reference period of the census.

In order to obviate these defects, preliminary investigations were carried out at the Institute of Agricultural Research Statistics, Indian Council of Agricultural Research, to evolve a suitable sampling technique for collecting the information on milk yield, breeds and management practices which influence milk production. The whole work for the implementation of the programme based on these investigations entrusted to the National Sample Survey.

Report No. 35 of the National Sample Survey published the results of such investigations during the course of the fifth, sixth and seventh survey (April 1952 to March 1954). Along with this the Institute of Agricultural Research Statistics has been conducting surveys and has already covered practically the whole of the country. Some information on the subject can also be obtained indirectly from the data on consumer expenditure thrown by the National Sample Survey from 'Round' to 'Round'.

The Report on the Marketing of Ghee and other Milk Products, 1957 gives the distribution of the total milk produced in the country into its various uses, like consumed in fluid form, converted into ghee, butter, *dahi*, cream, *khoa*, *chhana*, etc. This distribution is as defective as the estimation of total milk.

Meat, edible offals and other by-products. The Report on the Marketing of Meat in India, 1950 gives data on the number of animals slaughtered and the average meat yield rates by type of animals. For projecting the figures beyond 1950, one can at best use the proportions given in the above mentioned Report. But in view of the promulgation of various legislative measures, banning cow slaughter in a number of States, this proportion is bound to have changed in recent years. The Marketing Directorate undertook a fresh survey in 1958-59 to obtain the latest information about the number of animals slaughtered and the average rates of meat yield. Latest estimates are being formulated on this basis.

In order to obtain accurate figures of meat, the Marketing Report had pointed out that provision for keeping records of inspection, seizure and disposal of meat, etc. should be made under statutory regulations in India. To achieve this end, a uniform *formula* for keeping the daily and monthly records of slaughter of animals in the slaughter houses, etc. is being evolved in consultation with the State Governments. After this *formula* has been finalized, it is hoped that the system of keeping records of meat production, etc. will be put on a rational basis.

Hides and skins. Estimates of hides and skins have to be obtained on the basis of the number of animals slaughtered for the production of meat as already explained and animals fallen due to natural death. Information on mortality rates of different types of animals for obtaining the figures for animals fallen due to natural death, is available only in the 'Reports on the Marketing of Hides and Skins'

published in the years 1952 and 1955.

Wool and hair. The Report on the Marketing of Wool and Hair, 1946 was the only source of information in this respect. The Marketing Directorate undertook a survey again and supplied information on—

1. yield rates of wool per animal clipped, and
2. percentage of sheep and lambs clipped to their total number.

As in the case of milk, etc., a series of pilot investigations are being carried out in the various parts of the country for the collection of data on the management practices of sheep and to study their influences on the production of wool. Methods have to be evolved to understand the conditions under which sheep flocks are maintained under different types of management such as stationary and nomadic and also the practices followed in the disposal of animals for slaughter. It will take time before the results of all such investigations can be applied to practical conditions in the field.

Eggs and poultry meat. The Report on the Marketing of Eggs in India and Burma, 1938 and the Report on the Marketing of Poultry in India, 1955 are the only sources of information. The former Report supplies information about the number of eggs laid per hen and per duck. From the break-up of the total number of fowls, ducks and other birds into males, females and chickens as given in the Livestock Census data, an estimate of the total number of eggs is formulated. The Report has also formed some estimates of the proportion of eggs available for consumption and retention for hatching. The proportions adopted are that out of every 1000 eggs laid, only 975 are actually collected, of which 778 are directly consumed as eggs and the remaining 197 retained for hatching.

Bones, horns, etc. The Report on the Marketing of Bones and Bonemeal, 1958, gives the yield rates of bones per animal of each type. Sources of data on slaughter statistics and mortality rates have already been discussed. Estimates of bones are then formed on the basis of these data. Similar estimates have been formulated by the Marketing Directorate on the average yield rates of horns, hoofs, tail stumps, etc.

Dung. The Directorate of Economics and Statistics, Ministry of Food and Agriculture, publishes from time to time the production of dung in the publication 'Indian Livestock Statistics' (this is not an

annual publication). This is based on the population data thrown out by the Livestock Censuses and evacuation rates as given in Wrights' 'Report on the Development of Cattle and Dairy Industries of India'. Of this total, the quantity used for manure is calculated by applying the proportions wasted and used as fuel as estimated by W. Burn in his 'Technological Possibilities of Agricultural Development in India.' The quantity available for manure according to this is only one-third of the total production.

During the past Rounds, the National Sample Survey has also collected some information about the production and utilization of dung for various purposes. No reliable estimates are, however, available at present.

Work at the Institute of Agricultural Research Statistics

The Institute of Agricultural Research Statistics has developed a suitable technique for estimation of milk production and other livestock products, viz., eggs, wool and meat and collection of data on animal husbandry practices. The technique for the sample survey consists of a detailed survey extending over a whole year in which the milk yield in respect of the selected animals is recorded by actual weighment. Exploratory Sample Surveys for estimating annual production of milk and eggs and for studying bovine and poultry management practices were carried out by the Institute of Agricultural Research Statistics in a number of States. It is proposed to launch an all-India survey for estimation of production of the major livestock and poultry products during the Fourth Five Year Plan.

Fisheries Statistics

WITH A coast line of about 3000 miles and a continental shelf of more than 100,000 square miles, although India has vast aquatic resources, and about a million persons find employment in fishing and associated industries, practically little attention was paid to fisheries statistics up to the Second World War. The attention of the Government to the need for such statistics was, however, drawn by a number of Committees after the War.

The whole issue was examined in detail by the All-India Fisheries Conference held at New Delhi in September 1948. As a result, a Technical Committee 'on Co-ordination' of Fisheries Statistics was set up. Although the recommendations of the Committee were generally accepted, the position regarding the collection of such statistics did not improve much.

The matter came up again for consideration by the Government of India at the Madras Conference which recommended that the Directorate of Economics and Statistics in the Ministry of Food and Agriculture should organize collection of regular data on economic and commercial intelligence pertaining to fisheries and potential resources in the States. The FAO declared 1957-58 as the Fisheries Year and recommended the collection of fisheries data to member countries.

The Present Position

A number of organizations are at present engaged in the collection, compilation and publication of fisheries statistics. In the Ministry of Food and Agriculture, the Directorate of Economics and Statistics is collecting data on fish prices and progress of various fisheries development schemes ; the Directorate of Marketing and Inspection publishes comprehensive data on various aspects of fisheries in their Report on the Marketing of Fish in India ; the Central Marine Fisheries Research Station, Mandapam is in charge of collection of data on marine fish catches, catch of individual species, the number of different types of fishing units and other biological data and the Central Inland Fisheries Research Institute, Calcutta, collects data on inland fisheries. The Directorate of National Sample Survey is in charge of data on inland fisheries. The Directorate of National Sample Survey is in charge of data on fish catches and consumption. The State Governments also collect some data on inland and marine fisheries.

Fisheries of India may broadly be divided into the following two main categories :

1. Marine Fisheries. This includes fishing in ocean, coastal and off-shore waters, river estuaries and back waters.
2. Inland Fisheries. This covers catching, taking and gathering of fresh water fish from rivers, irrigation and other canals, lakes, tanks, inundated tracts, *jhils* or even rice fields.

Marine fisheries. The Central Marine Fisheries Research Station, Mandapam undertook a survey in 1948 to devise some means by which the landings could be estimated with a reasonable degree of accuracy. The Indian Council of Agricultural Research also undertook a similar pilot survey with the object of studying the possibility of applying the random sampling method for estimating the total catches of marine fish, and for studying the seasonal variations in the catches of important kinds of fish. The scheme was operated on the Malabar Coast of the Madras Presidency. The plan of sampling proposed was one of multi-stage random sampling with a village as the unit of sampling at the primary stage and the boat at the next stage. Daily records of the total catch for each of the sample boats were maintained separately for each variety of fish, throughout the year by trained enumerators in the selected villages.

The results of the ICAR survey were finalized but no tangible

steps have so far been taken to put the scheme in operation. Statistics on the catch of marine fisheries have, however, been developed from the year 1950 onwards by the Central Marine Fisheries Research Station, Mandapam. It has now a network of selected observation centres, each operating under a fishery survey assistant, spread on the east and west coasts of India which form the main source of supply of marine fish.

As a result of the recommendations of the *ad hoc* Fisheries Committee, 1954, the fishery survey programme was expanded considerably in 1957-58 with the number of zones increasing from 12 to 20 thus making each zone more compact with a more or less homogeneous fisheries area represented in it. The number of villages selected in the sample was increased to 185 by bringing in another 50 fish landing centres consisting of 92 fishing villages under observation during the year.

The data collected at these centres on actual catch, the trends of annual changes in fisheries and the fluctuations therein, are used for estimating the annual marine fish landings. These data are analysed in great detail and published annually in the Indian Journal of Fisheries. Data on fish landings by composition are, however, published at all-India level only. Figures are available zone-wise for one year—1955—only.

Statistics are also maintained on total effort in man-hours expended in each zone and catch in kilograms per man-hour. For the years prior to 1955, the report used to give catch per fisherman and per indigenous boat as well. The data on catch are maintained on monthly basis. The Journal gives statements on percentage distribution of total landings by months of each calendar year.

Role of NSS and ICAR

The work relating to the evolution of suitable techniques for estimation of fish catches, entrusted to the Indian Council of Agricultural Research consisted mainly of pilot investigations in typical coastal regions with a view to evolving suitable sampling techniques for estimating the marine fish catches which could be adopted by the State Fisheries Departments as an annual routine measure. These investigations covered Malabar Coast in 1950-51, Madras State in 1953-54 and Travancore Cochin Coast in 1954-55 and Canara and North Bombay Coasts.

On the basis of the experience gained during the pilot and extension surveys, the ICAR prepared an All-India Marine Fisheries Survey Scheme for estimating the total catch of marine fish, for implementation during 1956-57. In the meantime, work relating to fisheries surveys was transferred to the Directorate of National Sample Survey. Except for compilation and analysis of some pending data, the Directorate of NSS did not proceed with the plans prepared by the ICAR. The Directorate of NSS, however, formulated a scheme for estimation of marine fish catches on an all-India basis for implementation during the Third Plan period.

This scheme was considered by an Inter-Departmental meeting held in April 1962, in the Central Statistical Organization. It was felt that since the Mandapam Institute had built up an expertise in marine fish catch surveys, the Institute should continue its work. States' participation in the sample survey work of the Institute should be encouraged to enlarge the sample size with a view to providing State-wise estimates of marine fish catches.

The 1966 Census

A Technical Committee on Fisheries Statistics has been set up in the Department of Statistics to look into various aspects of collection of fisheries statistics. Data on number of fishing crafts and tackles has been collected on complete enumeration basis during the Livestock Census, 1966 for the first time. The list of items for which information has been collected is as under :

1. Fishing Crafts.
 - (a) Catamarans.
 - (b) Dugout Canoes.
 - (c) Big, size 32 ft. and above.
 - (d) Small, size less than 32 ft.
2. Power Vessels.
 - (a) Fishing boats worked by power.
 - (b) Carrier boats worked by power.
3. Fishing Nets.
 - (a) Fixed or stationary.

- (b) Bag and purse.
- (c) Boat Seine.
- (d) Shore Seine.
- (e) Drift and Gill.
- (f) Scoop.
- (g) Trawl type.
- (h) Cast.
- (i) Others.

Inland Fisheries

The only statistics available in this regard at present are those given in the Report on the Marketing of Fish in the Indian Union published in 1951 by the Directorate of Marketing and Inspection. This Report contains the following data :

1. Estimated production of sea fish in India according to varieties and by regions.
2. Estimated marketable surplus of fresh water fish according to varieties and by regions.
3. Approximate number of vessels used for sea-fishing.
4. Number of persons engaged in fishing.
5. Seasonal variations and annual trends in production.
6. Imports and exports of fish and fish products.
7. Prices prevailing in some important centres in producing as well as consuming areas by varieties of fish and by States.
8. Gross distributive margins.
9. Purpose-wise distribution of fish, *e.g.*, fish consumed in fresh form, fish used for salting and sun drying and fish used as manure etc.

The year of reference though not explicitly stated anywhere in the Report is 1948 as stated by the Central Statistical Organization in their 'National Income Statistics.' These data are not based on any

scientifically planned surveys but mostly on trade enquiries and similar other evidence. The fresh water fish estimates depend on the information supplied by local officers, trade and municipalities as no other exact data of any other kind are available.

No regular data for post-1948-49 period are available on similar lines in a published form. Annual estimates of fresh water fish are, however, being formulated by the Fisheries Development Adviser, Ministry of Food and Agriculture and published in the 'Statistical Abstract of India' along with marine fish data.

The Fisheries Development Adviser formulates his estimates by using the proportions of marketable surplus of inland fish to total landings of marine fish, as given in the Report on the Marketing of Fish in the Indian Union. The assumption made is that marketable surplus of fresh water fish formed 40.8 per cent of total marine fish landed during 1948-49, the reference year. Marketing Report figures of fresh water fish are, in other words, carried forward using the annual trends of landings of marine fish. Obviously such an estimate is subject to a large margin of error. There is no logic in the assumption that the factors governing the resources of inland and marine fisheries and their actual exploitation will behave in the same manner.

Taking the figures in the Marketing Report as the base, production index in 1956 was 191, which shows that the total landings (of marine fish) had almost doubled during the previous 7 years. Information similar to the 1951 Marketing Report has also been collected for the year 1956-57 by the Marketing Directorate. The marketable surplus of fresh water fish according to this Report increased by only 17.2 per cent during the same period.¹

Direct estimates are not available anywhere with regard to the retention of inland fish by professional fishermen for their own consumption. Certain data were collected in this respect by the Marketing Directorate as a part of their earlier market survey in 1948. This was in the form of percentages of marketable surplus to total estimated production and related to the set-up of States before integration. In the absence of similar data in their 1956 Report, the "National Income Statistics" have used the same data with slight adjustments to suit the reorganized set-up of States. Such estimates are given in Table 26.

1. National Income Statistics, C.S.O., 1960, p. 79.

TABLE 26

ESTIMATED PRODUCTION OF FISH IN INDIA

('1000' tonnes)

<i>Year</i>	<i>Inland production</i>	<i>Marine production</i>	<i>Total</i>
1951	218.0	534.0	752.0
1952	215.8	528.4	744.2
1953	237.5	581.4	818.9
1954	240.3	588.2	828.5
1955	243.3	595.7	839.0
1956	293.5	718.8	1012.3
1957	357.5	870.5	1233.0
1958	308.5	755.9	1064.4
1959	238.2	584.6	822.8
1960	280.2	879.7	1159.9
1961	277.4	683.6	961.0
1962	329.7	644.2	973.9
1963	390.2	655.5	1045.7
1964	459.9	860.3	1320.2
1965	507.1	824.4	1331.5
1966	477.5	889.9	1367.4
1967	536.8	863.4	1400.2
1968	621.7	904.2	1525.9

Source : Fisheries Division, Ministry of Food, Agriculture, Community Development & Cooperation, (Department of Agriculture) Government of India.

State Organizations

Some of the State Governments have also taken steps during recent years to collect various types of fishery statistics with the help of existing agencies. But there does not appear to exist any uniformity in the items of information being collected, method of collection, agency employed etc. It will not, therefore, be far wrong to say that we have still no reliable fishery statistics on an all-India level.

From among the various states, Madras has a large number of government curing yards. They are maintaining regular data on species-wise daily catches of fish at landing centres lying within the jurisdiction of their yards. Some stray efforts have also been made to collect statistics about inland fisheries since 1945. All the available information on fisheries has been published in an *ad hoc* publication of the Department of Statistics, Madras—'Statistics for the Re-organized State of Madras,' 1950. This contains fisheries statistics pertaining to intensive (fish) seed collection and distribution, fishing vessels (under Deep Sea Fishing Scheme), fish canning transactions and shark liver oil production in the reorganized State for 1956-57. Data collected in some of the exploratory studies are being published in the Annual Reports of the Fisheries Department.

The State Department of Fisheries, Maharashtra also publishes in its annual report some of the scattered data available with them on the subject. The statistical Abstract of Orissa, published by the State Bureau of Economics and Statistics, gives figures of export of fish from Chilka Lake for the years 1955-57. The Quarterly Bulletin of Statistics, Orissa, gives data on quantity of fish sold in the Municipal markets of Orissa and the average price per unit sold.

Similarly, the Directorate of Economics and Statistics, Himachal Pradesh, has also built up estimates of fish caught for the years 1950-51 to 1955-56. States like Uttar Pradesh and Madhya Pradesh have also formulated their *ad hoc* estimates of out-turn of fish, etc.

Estuarine Surveys

The estuarine survey now being conducted in West Bengal for the Hooghly-Matla estuarine system by the Central Inland Fisheries Research Institute is a multi-purpose survey which gives information on fish production, salinity, plankton, fish eggs and larvae and

fish biology. The sampling design consists of a total enumeration in some areas in the lower estuary at the landing centres and a multistage stratified cluster sampling in the upper stretches. All the gears in the upper estuary were first recorded at village level. The upper estuary is stratified into 4 strata. Three to four villages are taken per stratum at random with the restriction of keeping the average distance between villages to about 15 miles. For each village, 2 clusters of 2 days at a distance of a fortnight are then selected and for each day the effort by different gears and their catch are observed. Production is then estimated using a ratio method by taking the number of gears possessed per village as the auxiliary variate. During the fortnightly visits the data collected each day relate to the number of different types of gears used, catch by type of gear, time spent in fishing, number of hauls made, species-wise catch, etc. In addition, water samples are collected for salinity and temperature. At the landing centres data collected consist of type of unit employed, fishing ground, species-wise catch, number of men, boats and gears employed and tidal condition.

The second estuarine survey being conducted by the Central Inland Fisheries Research Station is on the Mahanadi estuary. It is a combination of two surveys, a market survey to get estimates of total dry fish marketed and the other surveys, to get other fishery information. For the market surveys all the major markets are covered on days selected at random every month. For minor markets a simple random sample of a few markets is selected and then sampled on random days. The data are collected on quantity of dry fish marketed and other allied information. For the second surveys, the entire catch is stratified into eight water zones and each water zone is covered for two days every fortnight with the help of a motorized water transport. This survey aims at collecting data on fish biology, salinity, plankton, fish eggs and larvae, etc.

There is another survey for collecting data in respect of hilsa fish. The survey is conducted in Krishna and Godavari Estuaries. It is a parallel of the Hooghly-Matla survey¹.

Riverine Surveys

The Central Inland Fisheries Institute has been conducting a survey on the Ganges and Jamuna rivers to collect data on species-

1. R.S. Chadha, *Fisheries Statistics in India, Agricultural Situation in India, Jan. 1968*.

wise catch, fishing grounds, gears etc. The coverage is incomplete at present at the stretches of Ganga and Jamuna covered are only 800 and 400 miles respectively and the tributaries are not surveyed as yet. The design of a survey consists of dividing the entire stretch of Ganga and Jamuna from Fatehgarh to Rajmahal and Agra to Allahabad respectively into 8 zones, each having about 3-4 assembling-centres. Two clusters of 2-3 days each are selected at random for sampling each assembling centre. Preliminary work has also been started on Krishna-Godavari and Nerbada-Tapti riverine systems:

Chilka Lake Survey

The Inland Fisheries Institute has also initiated a survey for estimation of fish catch and its species-wise and size composition. The catch of the lake reaches 7 godowns. The catch is examined with respect to species, composition, size and weight. Weight is determined by actual weighing in godowns. Random sampling is followed in sampling godowns; about 3 to 4 samples taken randomly every fortnight. The catch estimate arrived at in this manner is checked with the railway export figures.

Miscellaneous Statistics

Data on prices of different species of fish for some selected markets are being collected and published by the Directorate of Economics and Statistics. In the sphere of indicators of fisheries development, the Directorate of Economics and Statistics has been obtaining quarterly progress reports on various fisheries schemes from the State Governments. Information on the quantity of fish caught with the help of vessels procured under TCM and Indo-Norwegian Projects and catches by small mechanised boats operating in coastal areas of Maharashtra and Gujarat is also collected. Full details of catches of large vessels operating on deep-sea fishing sections in Bombay and West Bengal and those of some private companies are also available. Some information on number of pearl gatherers and divers in respect of Tuticorin Chank Fishery and pearl gathering in the Gulf of Manner is also available in the Annual Reports of the Fisheries Departments of the concerned States. A survey of inland water resources has recently been conducted in West Bengal. This survey has provided useful information on area of different inland water resources, their number, depth, etc. Data on consumption of fish have been collected by the NSS during their socio-economic surveys.

Suggestions for Improvement

For a real improvement, the sampling design of the Mandapam survey should be made truly random to enable an objective estimation of marine fish catches. In order that State-wise estimates with reasonable accuracy become available, the sample size should be suitably increased by associating the State fisheries development staff with the Scheme. At present sampling errors of the estimates are not available. To enable an assessment of the accuracy of the estimates thrown up by the Mandapam Institute, sampling errors of the estimates should also be worked out and published along with the estimates of production, etc.

The question of improvement of inland fisheries statistics was also considered by the Inter-Departmental meeting held in April, 1962. In view of the paucity of data in the field of inland fisheries, it was recommended that the Directorate of NSS should take up the work of evaluation of techniques for estimation of inland fish catches on a priority basis. After the necessary techniques have been evolved for different types of inland fisheries, their extension on an all-India basis with the help of the State Fisheries Development staff needs to be taken up.

While steps are being taken by various organizations to collect a variety of fisheries statistics, much leeway still remains to be made up to place the fisheries statistics of the country on a firm footing. For this purpose concerted effort will have to be made by the Ministry of Food and Agriculture for co-ordinating the work of different agencies and organizing the collection of different types of data on uniform lines throughout the country.¹

Various other types of data required to be collected in the sphere of fisheries may be classified into the following four broad categories, viz :

- (i) *Potentialities* : The potentialities of development of fisheries will depend on the availability of water resources for exploitation, the number of persons engaged in fishing and allied industries and the equipment required for fishing.
- (ii) *Production* : The statistics of production should include both

1. R.S. Chadha, *Ibid.*

marine and inland fish and also of the manufactured products like shark liver oils and fish meal, which are necessary for estimating the contribution of fisheries to food supply and also trends therein.

- (iii) *Utilization, demand and supply* : These statistics relate to market arrivals, internal movement, prices received by fishermen and prices paid by the consumers.
- (iv) *Indicators of Fisheries Development* : These refer to the fixation of targets and assessment of progress of the different schemes for fisheries development.

Agricultural Price Statistics

THE TERM agricultural prices covers wholesale, retail and harvest prices of agricultural commodities as well as those of livestock and livestock products. For a proper understanding of the subject, each of these have been discussed separately.

Wholesale Prices

The earliest series of wholesale prices data available in the country relate to 1897 and are published in the "Prices and Wages," a publication issued by the Department of Commercial Intelligence and Statistics, Government of India, up to 1922. The series of index numbers of wholesale prices with 1873 as the base were published continuously by the same Department in their 'Index Numbers of Indian Prices' (1861-1931) with annual addenda.

The data were mainly based on the reports received from the selected commercial bodies at the important market centres. The compilation of these index numbers was discontinued from 1940. The Report on the 'Enquiry into the Rise of Prices in India, 1914,' by K.L. Datta also published a good deal of data on prices for the period 1890-1912.

Another price series, viz., "Wholesale Prices of Certain Selected Articles at Various Centres in India" was published in the *Indian Trade Journal* from January 1931 to September 1939 and subsequently con-

tinued as a separate publication till 1950, when it was discontinued.

Before World War II, the price data collected and published by the Department of Commercial Intelligence and Statistics related only to a few important markets. When controls and restrictions were imposed on movement, etc., of foodgrains during the War, the data being collected were found inadequate to meet the requirements. The then Department of Food started collecting prices from a large number of centres in the country. All this work was later on centralized in the Directorate of Economics and Statistics, Ministry of Food and Agriculture. Arrangements were made to obtain regularly the requisite data relating to wholesale prices of cereals and gram from about 600 centres distributed all over the country, every week by telegram.

Wholesale prices prevailing during the harvesting season were also being collected by the Imperial (State) Bank of India through its Branches and Pay Offices previously. These data which were unutilized before, were also made use of by the Directorate.

Wholesale prices are now collected mostly under the Marketing Intelligence Scheme of the Directorate of Economics and Statistics. The centres selected for the collection of prices are distributed all over the country and are so chosen as to represent all the important *mandies*, rural and urban in the producing and consuming and surplus, deficit as well as self-sufficient regions.

Retail Prices

While fairly reliable wholesale prices are available over a long period, the same is not the position with retail prices. The Labour Bureau, Ministry of Labour, has been the principal organization at the Centre interested and responsible for the collection of retail prices. It has been compiling index numbers of working class cost of living and of retail prices at selected industrial, rural and urban centres. Eighteen series of working class cost of living index numbers for various industrial centres are compiled and published by it. These centres are intended to supplement those for which reliable cost of living index numbers are being compiled and published by the State Governments. These index numbers purport to measure the trends in the overall changes from the level in the year 1944 (which is the base period for most of the centres) of retail prices of goods and services that enter into the working class expenditure as revealed by the Family Budget enquiries carried out at these centres during the

years 1944 and 1945. The retail prices are generally obtained through part-time staff belonging to the Departments of Labour, Industries and Supplies, Revenue, etc. Apart from the cost of living index numbers, the Labour Bureau also compiles and publishes in the Indian Labour Gazette simple retail price relatives of certain selected articles including food items at 18 urban and 12 rural centres.

Retail prices for a few commodities like vegetables, fresh and dry fruits, fish and livestock products are also being collected by the Directorate of Economics and Statistics, Ministry of Food and Agriculture and published in its weekly Bulletin of Agricultural Prices. Retail prices for some of the other important agricultural commodities like the various foodgrains, etc. are also being collected at some selected centres and published by the Directorate in its annual publication, 'Agricultural Prices in India.'

Data on retail as on wholesale prices have been collected by the various State Governments over a long time mostly through Revenue and Agriculture Departments, Economics and Statistics Departments, Marketing Departments, etc. For building up consumer price index numbers of agricultural labourers, retail prices of agricultural commodities are collected through the NSS from a fixed set of 422 villages.

In spite of all this, the existing data on rural retail prices are not sufficient to enable one to determine the spread between producer and consumer prices. Detailed information on agricultural retail prices on a more comprehensive basis is extremely necessary in a developing economy. It is useful to determine the relationship between quantities demanded with changes in relative prices. The newly organized Market Intelligence Service in the Directorate of Economics and Statistics should come quite handy for the purpose.

Harvest Prices

Data on harvest prices of principal crops are available in the country for a fairly long time. These were formerly published in the 'Agricultural Statistics of India.' These Farm (Harvest) Prices are generally collected by the State Governments in accordance with a scheme (Appendix 15) drawn up by the Union Ministry of Food and Agriculture.

Under this scheme, prices at which producers dispose of their

produce at the village site during the specified harvest period, are collected from the selected villages in each District. Generally ten villages are selected in each District. The average harvest price for the State as a whole is worked out for each crop as a weighted average, with the District production figures for the current year as weights.

At present, 8 States and 2 Union territories are collecting the data. The data in the other States are collected only from a few selected centres and are not thus fully representative of prices obtaining in rural areas. In order that harvest prices are available on a uniform basis for the whole of the country, it is necessary that those States which have not adopted the scheme, should also make a beginning.

The harvest prices are at present received from the State Governments with a considerable time lag which varies from State to State and ranges from 1 to 6 years. One of the reasons for this big time-lag seems to be that the harvest prices are sent in the State Returns. It is, therefore, necessary that the returns on harvest prices should be sent separately.

Most of the State Governments have also not yet specified the varieties and qualities of all the commodities for which harvest prices are collected. To ensure that the variety and quality of a commodity selected for a District does not vary from year to year, it is necessary that the most commonly produced variety and quality of the commodities in each District may be fixed and harvest prices be reported for the selected variety and quality.

Various Agencies and the Publications

Price data at present are being collected by a number of agencies. The important ones are :

1. Directorate of Economics and Statistics, Ministry of Food and Agriculture.
2. Directorate of Marketing and Inspection.
3. Indian Labour Bureau, Ministry of Labour.
4. National Sample Survey.
5. Commodity Committees concerned with the commodity concerned.

6. State Revenue, Agriculture and Marketing Departments and Statistical Bureaus.

Directorate of Economics and Statistics: It collects the price data mainly through the primary agencies nominated by the State Governments. These primary reporters usually belong to the Revenue, Marketing, Civil Supplies, and Economics and Statistics Departments of the States. Commercial agencies and Banks also supply price data to it in certain cases. Its publications on prices are ;

1. Bulletin of Agricultural Prices (weekly).
2. Wholesale Prices of Foodgrains (weekly).
3. Agricultural Prices in India (annual). There is a time lag of about 5 years in this.
4. Agricultural Situation in India (monthly journal).
5. Farm (harvest) Prices of Principal Crops, 1947-48 to 1954-55 (supplement to *Agricultural Prices in India*, 1954).

Directorate of Marketing and Inspection: Prices collected by it relate only to such commodities as are not normally covered by any other agency. These prices are also not published regularly. Instead, they are given in marketing reports in the form of appendices with the result that the time-lag in the availability of these data are great.

Indian Labour Bureau: The Indian Labour (Monthly) Gazette publishes all the data collected by the Bureau.

National Sample Survey

Wholesale and retail prices were also being collected by the NSS upto the 13th Round as a part of their socio-economic surveys. The investigators employed in the survey collected these prices on weekly basis for randomly selected centres located in rural and urban areas. Of these, only weekly retail prices were published by the Indian Statistical Institute in their 'Weekly Price Bulletin.' The published data pertained to rice, wheat, jowar, bajra, ragi, gram, barley, arhar dal, gram dal, masur dal, moong dal, urid dal, kheshari dal, gur, potato, onion, dry chillies, turmeric, fire-wood, arecanuts, tobacco, betel-leaf and straw.

Besides the prices collected in the schedule, the NSS have also

collected ex-farm prices, in respect of a large number of agricultural commodities as part of their cost of cultivation studies. From the 14th Round onward, the NSS is collecting data only in respect of retail prices. The data so collected from a fixed set of 422 villages are utilized for building up consumer price index numbers for agricultural labourers.

Commodity Committees : Data on wholesale prices of various agricultural commodities are collected by the respective Central Commodity Committees (now called Regional Development Centres) as part of their normal statistical work, for providing market intelligence to growers, traders, consumers and the Government. The data are collected through a variety of agencies like market reporters, market committees, non-official organizations, such as commercial firms of repute, chambers of commerce, etc., depending upon the agencies available at the market centres.

The Indian Sugar Trade Information Service of the Indian Institute of Sugar Technology was started in March 1934 to meet a very keen demand for information regarding statistics of sugar in the country. Daily wholesale prices of sugar, *gur* and *khandsari* are collected from important sugar and *gur* markets and published in the *Sugar Market Daily* and *Weekly Bulletins*.

The Indian Central Cotton Committee collects daily prices of cotton, *kapas* and lint, and cotton seed from important upcountry centres through the cotton market committees at these centres. Weekly (Wednesday) F.O.B. prices of varieties of cotton permitted for export are also collected from the Ports of shipment, viz., Bombay, Calcutta and Madras through an important cotton firm. The weekly average prices of cotton, *kapas*, etc., are published in the *Indian Cotton Growing Review*, a Quarterly Journal issued by the Committee.

The Indian Central Jute Committee collects detailed data on jute prices at Calcutta and upcountry markets through its own technical staff as well as private agencies. The data collected are disseminated to the public mainly through radio and the monthly *Bulletin* of the Committee. Although the prices obtained for the varieties and grades are fairly representative of the areas from which they are received, the number of such centres is not large enough to give a comprehensive picture of the price movements in the entire jute growing area.

The Indian Central Oilseeds Committee does not collect any price data of its own but maintains a record of the prices of important oilseeds, oils and oilcakes published by various official and non-official organizations.

The Indian Central Tobacco Committee collects weekly, monthly and quarterly wholesale and retail prices of tobacco from important tobacco markets in the country. Prices are published in the Committee's Tobacco Bulletin every month. There is, however, a large diversity in the published data. In some cases, for example, the lowest and highest prices are quoted, in others the average price is given while for a majority of cases, only a single price is quoted.

The Indian Central Coconut Committee collects daily and weekly wholesale prices of copra, coconut oil and coconut oil-cake from important assembling, importing and exporting centres, through local dealers, market committees, etc. Prices of coconut and coconut products in respect of Cochin, Alleppey, Calicut, Badagara, Mangalore, Arsikere and Tiptur markets are published in the Committee's monthly *Bulletin*.

These Committees have since been abolished, but the work done by them has been taken over by the Regional Development Officer for each commodity under the overall control of the ICAR.

State Governments : One of the important sources of price data in the States has been the Revenue Departments. The State Revenue Departments need information on prices for purposes of periodical land revenue assessment operations. In some of the States, the District collectors are required to indicate the current price position for the 'Season and Crop Reports.'

In Northern India, particularly in the Punjab, price data are also being collected by the revenue agency at Cantonment Stations, mainly for the use of military authorities. While a part of this information is not published, a large number of States have been publishing the data in their respective State Gazettes.

The quality and the quantity of the price data collected by the Revenue or Agriculture Departments or other agencies like the State Statistical Bureaus in the country varies from State or State. They cover both wholesale and retail prices. Previously, there was wide duplication in respect of the collection of prices by various agencies.

As a result of the recommendations of Agricultural Prices Enquiry Committee, 1954, however, the work of price collection has been rationalized and prices collected by one agency are now usually not collected by another agency. The data collected by the State Revenue or Agriculture Departments are supplemented by prices of more important commodities collected by the State Statistical Bureaus through the District Statistical Officers. These prices are published in the quarterly/monthly *State Statistical Bulletins* and *Annual Statistical Abstracts* of the Bureaus.

Livestock and Livestock Products

Practically no information was available about the prices of livestock, livestock products and cattle feed before 1948. As already mentioned, some scattered data were published in the *State Gazettes*. Besides the information now available in the Marketing Reports, *State Statistical Bulletins* of the Statistical Bureaus and the NSS, the Directorate of Economics and Statistics, Ministry of Food and Agriculture is now publishing price data in the mid-month issue of the *Weekly Bulletin of Prices*, on different categories of livestock and poultry. Wholesale and retail prices of major livestock products along with those of fish and oilcakes are also published in the *Bulletin*. In addition to this, average month-end and annual wholesale prices of important categories of livestock, livestock products and cattle feed in respect of important selected markets are published in the Directorate's annual publications *Indian Livestock Statistics* and *Agricultural Prices in India*, in respect of selected centres. There is also a good deal of unpublished data available with the Directorate of Economics and Statistics. The National Income Unit of the Central Statistical Organization has given a comprehensive summary of all the available data on livestock and livestock and farm products.

Index Numbers of Prices

INDEX NUMBERS are devices for measuring differences in the magnitude of a group of related variables over a period of time, between places or between like categories. These variables may be in terms of price of commodities or the physical quantity of goods produced or marketed. Generally, the object of index numbers is to combine prices of a large number of different commodities into one meaningful summary, reflecting the average change from time to time.

Purpose

Index numbers of prices may be studied in order to enforce price controls to maintain stability in purchasing power. Many a time wages may be adjusted so that real wages remain constant. Index numbers are also useful for comparison between the cost of living at different places, for measuring changes in physical volume over a period of time in trade, agricultural, industrial and factory production, sales and stocks, profits, etc. They are important for devising forecast indices.

In India, index numbers are fairly old. Index numbers of prices of exported and imported articles, retail prices of foodgrains and wholesale prices were compiled earlier with 1873 as the base year. A quinquennial publication named *Index Numbers of Indian Prices* and its annual supplements published all the above indices.

The nature, scope and method of construction of index number series relating to agriculture is discussed below. The series relate to

1. Commodity prices.
2. Agricultural production.
3. Working class cost of living.
4. Foreign trade.

1. *Index numbers of Commodity Prices*

By far the most important index numbers relate to prices. At present in India, separate indices are being compiled for harvest prices, wholesale prices, retail prices in rural areas, retail prices in urban areas, etc.

The following series have been described in detail :

1. Index number of Harvest Prices compiled by the Ministry of Food and Agriculture.
2. Index Number of wholesale prices compiled by the office of the Economic Adviser, Ministry of Commerce and Industry.
3. Index number of Wholesale Prices in Calcutta, compiled by the DGCIS, Ministry of Commerce and Industry.
4. Index Number of Retail Prices (Urban Centres) compiled by the Labour Bureau, Ministry of Labour.
5. Index Numbers of Retail Prices (Rural Centres) compiled by the Labour Bureau.

Harvest Prices Index

In pursuance of the recommendations of the Inter-Departmental Committee on Official Statistics, 1946, the Directorate of Economics and Statistics, Ministry of Agriculture undertook the compilation of Index Numbers of Harvest Prices of Principal Crops in India. A brief description of the scope and method of construction of these Index Numbers is given below.

Base period. The base period of the series is the agricultural year 1938-39, i.e., July 1938 to June 1939.

Weights. A system of double weighting is being adopted in working out this series. In the first instance to work out a commodity

index, moving weights are used for combining the price relatives for different States into the commodity price relative taking their weighted geometric mean ; figures of the current year's production in the different States covered being used as weights. Subsequently, to work out the all-commodity index, weights are assigned to the different crops in proportion to the average value of production of each crop in the States covered by the series during the three years ending 1938-39. Production is then evaluated at harvest prices prevailing in the different States during the period under reference.

Crops covered. The index covers the following 15 crops divided into three groups :

(a) *Foodgrains*—

Rice, Jowar, Bajra, Maize, Wheat, Barley and Gram.

(b) *Oilseeds*—

Groundnut, Sesamum, Rape and Mustard and Linseed.

(c) *Miscellaneous*—

Sugar (raw), Tobacco, Cotton and Jute.

Other important crops such as pulses other than gram, plantation crops, spices, etc. could not be included in the index numbers because of the non-availability of the prices and other relevant data for these commodities in the base year.

States covered. The States covered by the index are the former part 'A' States of Andhra, Assam, Bihar, Bombay, Madhya Pradesh, Madras, Orissa, Punjab, Uttar Pradesh and West Bengal and the former part 'C' State of Delhi. The total geographical area of these States formed about 60 per cent of the total geographical area of the country.

Nature of prices data. The prices data forming the basis of the Index Numbers are 'Harvest Season Prices' reported by the branches of the State Bank of India (formerly, the Imperial Bank of India). For each crop, important marketing centres have been selected in the States covered by the Index and for each of these centres, weekly Wholesale Prices during the prescribed harvest period of 6-8 weeks are reported by the concerned branches of the State Bank of India. A simple average of the weekly quotations is taken to represent the "Harvest Season Price" for that commodity at that centre. It is these prices that are utilized in the construction of the index.

These "Harvest Season Prices," it may be pointed out, are different from the "Farm (Harvest) Prices" published by the Directorate in "Agricultural Prices in India." The Farm (Harvest) Price is defined as the average wholesale price at which the commodity is disposed of by the producer at the village site, during the specified harvesting period. The Farm (Harvest) Price data are collected every week from a number of villages, selected on a purposive basis, during the specified harvest period of six to eight weeks in respect of the important crops; the weekly prices are averaged into tehsil and district averages by taking their simple mean; and the State average is worked out as a weighted average of the district prices with the production of the crop in the districts as weights. The Farm (Harvest) Prices are not being reported by all the States at present, and, as such, the question of their utilisation in the construction of the index is yet to wait.

Method of construction. Chain base method has been used in the construction of the Index in view of the fact that price quotations are not uniformly available throughout the period. The current year's price relatives are computed in relation to the previous year and are linked with the base year through the intermediate years.

The detailed method of computing the price relatives and averaging is as under :

Computation of State Price Relative for each crop

The price relative for each crop is worked out for each State as follows :

- (i) For each year, the price relative for each variety of crop at each centre is computed in relation to the corresponding price for the previous year.
- (ii) A simple geometric average for such price relatives for the different varieties of the crop at each centre gives the price relative of the crop at that centre.
- (iii) A simple geometric average of the price relatives at the different centres gives the single price relative for the State for the crop.

Computation of All-India Price Relative for each crop

The price relatives for the different States are combined into the commodity price relative taking their weighted geometric mean

figures of the current year's production in the different States covered being used as weights. As the price relative in each year is computed with the previous year as the base, the system of moving weights has been adopted.

Linking with base year

After compiling the price indices for each year relative to the previous year, these are linked through the successive intermediate years with the base year (*i.e.* Agricultural year 1938-39) to get the Index Numbers for each of the crops.

Group and All-Crop Indices

The weighted arithmetic mean of the index numbers for the individual crops with the average value of their production during the three years ending 1938-39 as weights, give the All-India Index Numbers of Harvest Prices for "Groups" and "All-Crops". Hitherto the type of average used for combining, crop-wise indices into "Group" and "All-Commodities" indices was weighted geometric mean. This has now been changed to "weighted arithmetic mean" to fall in line with other current series of Index Numbers such as agricultural production, wholesale prices, etc. The "Group" and "All-Commodities" Index Numbers, published earlier, have been revised according to the revised method of averaging.

ECONOMIC ADVISER'S INDEX NUMBER OF WHOLESALE PRICES

Background of the Earlier Indices of Wholesale Prices

The Office of the Economic Adviser to the Government of India undertook to publish for the first time Index Numbers of Wholesale Prices from the week commencing from 10th January 1942 with base week ended 19th August 1939=100. The index was calculated as the price relatives of 23 commodities which were assigned equal weights and was known as the sensitive index number of prices. The index was classified into four groups, *viz.*, Food and Tobacco, Agricultural Commodities, Raw Materials and Manufactured Articles.

An index for 'Food Articles' was prepared in 1945 with a wider coverage, with the last week of August 1939 as base. The index was a weighted geometric mean, the weights being proportional to the values of marketable surplus of the various commodities during

the year 1938-39. The base period of the Index was afterwards changed to the year ending August 1939. Subsequently, this series was expanded to cover other groups besides food articles and since 1947 this office started publishing each week a series of weighted index numbers of the wholesale prices with base year ended August 1939=100.

Compared with the earlier series containing 23 commodities, this series included as many as 78 commodities to give a more comprehensive picture of price movements in all important commodities, whether domestically produced or imported. The data published each week included both price-relatives and absolute prices of the various representative specifications of articles at representative markets.

The commodities were arranged into sub-groups, groups and the individual index numbers were combined each week to give index value for these sub-groups and groups. In order to combine the indices for individual articles into groups or sub-groups in the series, each commodity was weighted by the importance which it represented in the total marketing during 1939. The combination of 215 individual quotations for 78 commodities into group indices was worked out by the weighted geometric mean method.

The partition of the country and the major changes in the economic structure made the index out-of-date. Many new commodities, specially in the field of manufactures, became significant and the relative importance of commodities other than manufactures also changed. Moreover, the year ending August 1939 had ceased to be appropriate as the base year. In accordance with the recommendation of the Standing Committee of Departmental Statisticians, the Economic Adviser's Office issued a revised series of index with 1952-53 as base. This consisted of 112 commodities comprising 555 individual quotations. The arithmetic average was adopted in preference to the geometric mean adopted in the series. Cereals were covered comprehensively on the basis of 99 markets specified by the Agricultural Price Enquiry Committee (also known as Thappar Committee). As regards the non-agricultural commodities, these were selected on the basis of availability of price data at producing and consuming centres and markets were selected on the basis of suggestions given by State Governments and various organisations like Chambers of Commerce and Trade Associations. The existing (revised)

series of index numbers with 1952-53 as base is being issued regularly every week since April 1956. The old series with 1939 as base was also continued for some years in order to provide comparability in watching the trends of the two series over a period of time. It was discontinued with effect from March 1960.

The weighting pattern of this index was based on the year 1948-49, although the price-base was 1952-53. The weights assigned to various commodities were derived from the estimates of marketed values of domestic produce and the values of imports inclusive of duty. For manufactures the figures were taken from the Third Census of Indian Manufactures 1948 and imports were also taken into account. With regard to intermediate products, only the portion produced for sale was taken note of. For the Food Group, only marketed surplus and imports were taken into account; the estimates of percentages of marketable surpluses to total production were based on pre-1939 estimates in the absence of more up-to-date data, although the total production referred to 1948-49.

New Series (1961-62 as base)

The existing series as stated in earlier paragraphs covered comprehensively agricultural commodities as recommended by the Thapar Committee but it did not include the non-agricultural commodities as extensively as it should have been done. It was, therefore, decided that while the existing index should be published, there should be an enquiry into the choice of quotations, etc. for the non-agricultural portion of the Index of Wholesale Prices and arrangement made for placing them on a satisfactory basis as was done for the agricultural commodities by the Thapar Committee. With a view to remedying this drawback in the Index, the Government of India in the then Ministry of Commerce & Industry constituted a Committee for improving the coverage and mode of collection of price quotations of non-agricultural commodities utilised in the compilation of Index Number of Wholesale Prices in India.

The terms of reference of the Committee were as follows :

- (1) to examine the collection and processing of prices of non-agricultural items for the compilation of Index Number of Wholesale Prices, and
- (2) to suggest improvements.

The Committee sent communications to various Chambers of Commerce, Trade Associations, State Governments and Central Government Ministries and other interested bodies inviting suggestions for incorporation of new commodities in the wholesale prices index along with specifications and markets. After the replies were received, they were scrutinized and a list of additional non-agricultural commodities, for which price quotations were available on a regular basis, was prepared.

The Committee went into other technical aspects of the Index, e.g., weighting diagram, base period, content of prices, method of compilation and commodity classifications, etc.

The new series is largely based on the recommendations made by the Committee and covers a number of additional items particularly in the manufactured category which have assumed greater importance in the national economy and their incorporation is likely to go a long way in improving the coverage. Besides, the base has also been shifted to a more recent year (1961-62).

Coverage of New Series

There has been, in recent years, considerable progress in the field of industrial development and with the improvement of price statistics, it has been possible to extend the coverage of the index. The new series includes 139 commodities and 774 quotations as compared to 112 commodities and 555 quotations in the earlier one.

New commodities included in the new series are : butter, khandsari, confectionary, processed foods, coir fibre, coke, other ores (gypsum, fire-clay, china clay, magnesite, bauxite), industrial alcohol, hydrochloric acid, calcium carbide, copper sulphate, carbon dioxide, electrical machinery, textile stores, coir matts and matings, other rubber products, insecticides, essential oils, toilet requisites, cutlery and hardware, lamps and lanterns, clocks and watches and plastic materials. It may be mentioned here that these are broad commodity descriptions for which separate weights have been assigned. But within most of these commodities there are a number of easily identifiable items which have been treated as specifications because they could not be given separate weights. For instance, in *Electrical Machinery and Appliances* are included items like electric motors, ceiling fans, electric lamps, dry cells and batteries, house service meters, power and distribution transformers.

The expanded list of quotations and markets are more comprehensive in the new series than in the existing series of the index. Commodity-wise distribution of quotations has also been improved in the new series. Table 27 shows group-wise distribution of commodities, markets and quotations :

TABLE 27
GROUP-WISE DISTRIBUTION OF COMMODITIES, MARKETS
AND QUOTATIONS

Group	No. of Commodities		No. of Markets		No. of Quotations	
	Exist- ing Series	New Series	Exist- ing Series	New Series	Exist- ing Series	New Series
1. Food Articles	31	38	105	128	216	275
2. Liquor and Tobacco	3	3	5	6	10	12
3. Fuel, Power, Light and Lubricants	8	10	7	7	24	28
4. Industrial Raw Materials	23	25	37	47	84	106
5. Chemicals	*	11	*	6	*	16
6. Machinery and Trans- port Equipment	*	7	*	18	*	83
7. Manufactures :						
(a) Intermediate Products	14	13	7	7	44	43
(b) Finished Products	33	32	22	36	177	211
TOTAL	112	139	—	—	555	774

* New Group.

Source : A Note on the Index Numbers of Wholesale Prices in India
(New Series), 1969.

The choice of specifications and markets for commodities are based on an examination of the place of each commodity in the national economy and the representative character of the markets and varieties.

Additions or deletions of agricultural commodities/specifications and markets in the new series have been made in consultation with the Ministry of Food, Agriculture, Community Development & Co-operation. The recommendations made by the Wholesale Prices Index Revision Committee in consultation with various Chambers of Commerce, leading manufacturers and Government offices at the Centre and the States provided a basis for the

expansion of non-agricultural items. As regards content of prices, they represent wholesale transactions at the primary stage. In cases where data are quoted for other points of distribution, the place and the terms of delivery are clearly specified. Excise duties are included in the prices, but sales tax is generally excluded. Where they are included, they are specifically mentioned.

The price data are collected through official as well as non-official sources. The official sources are : Agricultural Marketing Department, Bureau of Economics and Statistics, District and Sub-Divisional Offices, Forest Officers, Registrars of Co-operative Societies and other primary agencies belonging to the State Governments, Directorate of Economics and Statistics, Collectors of Customs, Central Commodity Committees, State Bank of India, etc. The non-official sources are Chambers of Commerce, Trade Associations and leading business houses. The table below shows a comparative picture of quotations from official and non-official sources in the existing and new series :

<i>Existing Series</i>			<i>New Series</i>		
<i>Official Sources</i>	<i>Non-official Sources</i>	<i>Total</i>	<i>Official Sources</i>	<i>Non-official Sources</i>	<i>Total</i>
295	260	555	382	392	774

Out of 774 quotations included in the new series, 382 quotations are received from official sources and the remaining 392 quotations are obtained from non-official sources. Majority of the quotations received from official sources relate to agricultural commodities, while the non-official quotations pertain to manufactured and non-agricultural commodities. The increase in the number of quotations from non-official sources is largely on account of inclusion of a wide range of non-agricultural commodities. The price returns received from various sources are scrutinised and discrepancies or abnormal variations noticed are pointed out to the reporting authorities.

Choice of Base

The existing wholesale prices index is compiled with the average price of 1952-53 as the price base. This was recommended by a working party set up by the Standing Committee of Departmental Statisticians on the ground that the general price level during

the year stood very close to the average of the preceding six years around which prices appeared to stabilise. The base for an index should, perhaps, be changed once in about ten years so that the current comparisons attempted by the Index remain economically significant and meaningful. The chief criteria for selecting the new base year are that it should be a year of narrow fluctuations in prices 'and as close as possible to the commencement of the Five Year Plan. The year 1961-62 is a period of comparative stability as compared to the earlier years, besides being the first year of the Third Five Year Plan. The Ninth Conference of Central and State Statisticians held in December 1960 recommended the adoption of a common base for all official Index Numbers. The Technical Advisory Committee on Cost of Living Index Numbers recommended adoption of the calendar year 1960 as common base for the working class and middle class consumer price Index Numbers. The Central Statistical Organisation has changed the base year from 1956 to 1960 in the index of Industrial Production. However, in the case of Wholesale Prices Index Numbers, 1961-62 has been taken as the base year because it was the normal year from the point of view of price trends which were more stable in 1961-62 when compared to 1960-61.

Commodity Classification

In the matter of commodity-classification, the existing and the new series follow the practice recommended in the Standard International Trade Classification, with slight alterations to fit in with the Indian situation. Compared with the existing series, the new series contains two more additional groups : (i) 'Chemicals' and (ii) 'Machinery and Transport Equipment' on account of development of Chemical and Engineering Industries. The two new groups were originally sub-groups under Manufactures. The following is the new set of groupings :

- (1) Food Articles.
- (2) Liquor & Tobacco.
- (3) Fuel, Power, Light & Lubricants.
- (4) Industrial Raw Materials.
- (5) Chemicals.
- (6) Machinery & Transport Equipment.
- (7) *Manufactures* (Not elsewhere classified).
 - (a) Intermediate products ;
 - (b) Finished Products.

The three groups "Manufactures", "Chemicals" and "Machinery & Transport Equipment" of the new series together are comparable to "Manufactures" of the existing series. The new group "Machinery & Transport Equipment" is split into three sub-groups *viz.*, Electrical Machinery, Transport Equipment and other Machinery. The Group "Manufactures" is divided, as in the earlier series into "Intermediate Products" and "Finished Products" which are further divided into sub-groups classified according to commodities.

Weighting System

In the existing series, the weight base and price comparison base were different. The price base relates to 1952-53, while weight base pertains to 1948-49, as complete data for working out weights pertaining to 1952-53 were not available at the time the index was constructed. The weight base of the new series is the same as the price base *i.e.*, the financial year 1961-62 which is a distinct improvement. Generally the weights assigned to various commodities are based on the estimates of marketed values of domestic produce and the values of imports inclusive of excise duty, as in the existing series. Statewise production figures for most of the agricultural items were obtained from the Directorate of Economics and Statistics, Ministry of Food, Agriculture, Community Development and Cooperation and they were valued at the harvest prices supplied by them. Wholesale prices were also used wherever the harvest prices were not available. Production figures of items like spices were obtained from reports of the Agricultural Marketing Adviser. To arrive at the marketable surplus in case of agricultural items the retention ratios (percentage of production retained by the producer) were also obtained from the Office of the Agricultural Marketing Adviser, for the latest year available with them. In the case of sugarcane, cotton raw and cotton yarn, the quantities consumed by the mills using them as raw materials have been taken into account. In case of manufactured articles, the gross value of products for the year 1961 as given in the Annual Survey of Industries was taken into account. In the case of some items where production figures are not given in the Annual Survey of Industries data were obtained from the annual report of the Director General Technical Development, imports and excise duties are also added to the values wherever applicable, as these elements are part of the basic cost. As regards "Intermediate Products," only the portion produced for sale has been considered. In the case of electricity, the weight is based on the energy sold by electricity undertakings and valued

at the average all India rate. The weights for "Mineral Oils" are based on consumption figures.

TABLE 28
COMPARISON OF WEIGHTS IN THE NEW AND EXISTING SERIES

				<i>New series</i>	<i>Existing series</i>
1. Food Articles	...	...	...	413	404
2. Liquor and Tobacco		...	...	25	21
3. Fuel, Power, Light and Lubricants			...	61	30
4. Industrial Raw Materials		...	...	121	155
5. Machinery and Transport Equipment		...	...	79	—
6. Chemicals	...	...	...	7	—
7. <i>Manufactured Articles</i>		...	...	294	290
(a) Intermediate Products		...	...	(57)	(41)
(b) Finished Products		...	...	(237)	(249)
				1,000	1,000

Source: A Note on the Index Numbers of Wholesale Prices in India (New Series), 1969.

The new system of weights reflects some important changes. The weight of the Food Group has decreased from 50.4 to 41.3 per cent and of Industrial Raw Materials from 15.5 to 12.1 per cent while the weights for the Manufactured categories including Chemicals and Machinery and Transport Equipment have increased from 29 to 38 per cent and for the Fuel, Power, Light and Lubricants from 3 to 6.1 per cent. The shifting of weights from "Food" and "Industrial Raw Materials" groups to "Manufactures" and "Fuel, Power, Light and Lubricants" groups is mainly due to increased production and inclusion of a number of new items under "Manufactures" and under "Fuel, Power, Light and Lubricants" groups.

Method of Calculation

The new series is calculated on the principle of weighted arithmetic mean. Weekly quotations for the prescribed varieties on

or about each Friday are collected. The price relatives are calculated as the percentage ratios which current price quotations bear to those prevailing in the base period. In other words the price relative for each variety in a market is calculated by dividing the current price quotation by the corresponding base price (1961-62) and multiplying it by 100. The commodity index is arrived at as the simple arithmetic average of price relatives of varieties in different markets. The sub-group or group index is derived as the weighted arithmetic mean of commodity indices and is worked out by first multiplying the index for each commodity by weights assigned to it and then by dividing the totals of these multiplications by the total weights of the relevant sub-groups or groups. Likewise, the All-Commodities Index is computed as the weighted arithmetic mean of group indices by multiplying the group indices by weights assigned to them and then by dividing the totals of these multiplications by the total weights of the relevant groups.

The very basis of this method would indicate the necessity of reviewing the prescribed varieties etc. from time to time. With the introduction of high yielding varieties during the last two-three years, this has become all the more important. Taking the example of wheat, since Mexican wheat did not exist during 1960, wheat price index was primarily based on the prices of indigenous wheat. The present wheat index is not, therefore, fully representative of the market situation, where Mexican wheat forms a substantial portion of the total wheat production. With regard to prices also while those of Mexican wheat have either remained stationary or fallen a bit, the price of indigenous wheat has shown a substantial increase.

Continuity of Index Numbers of Wholesale Prices

In order to maintain continuity in the Index Numbers of Wholesale Prices, the new series will be linked by suitable conversion factors for the base period in respect of individual commodities and the general index. The general indices of the two series will be linked on the following basis: 100 of the new series=125.1 (being the average of 1961-62) of the existing series. The items and groups of the new series will be broadly comparable to the items and the groups of existing series after certain adjustments where necessary. The latest available data on the two series are as shown in Tables 29 and 30.

TABLE 29
ECONOMIC ADVISER'S ALL-INDIA INDEX NUMBERS OF WHOLESALE PRICES BY GROUPS
(New Series)
(Base : 1961-62 = 100)

Year	Groups										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		Cereals	Pulses	Food articles	Liquor and tobacco	Fuel, power, light and lubricants	Industrial raw materials	Manufactured articles	Intermediate products	Finished products	All commodities
1962	...	104.0	117.8	107.4	102.0	102.1	98.1	102.4	102.7	102.4	104.2
1963	...	107.7	121.7	111.7	117.1	114.9	98.6	104.2	103.9	104.3	108.0
1964	...	129.4	174.8	130.6	127.9	119.7	111.7	107.5	109.1	107.3	119.3
1965	...	163.3	206.0	142.0	133.5	122.4	127.7	115.3	121.4	113.9	129.1
1966	...	198.6	259.5	161.9	138.4	132.5	151.8	125.5	135.8	123.1	144.5
1967	...	206.8	314.0	204.4	145.2	139.8	161.1	130.9	147.1	127.1	166.2
1968	...	198.0	250.5	200.5	178.5	147.2	152.7	132.7	144.6	129.8	165.3
1969	...	196.8	226.3	193.1	203.2	153.3	175.4	140.9	154.1	137.7	168.7

Source : A Note on the Index Numbers of Wholesale Prices India (New Series), Office of the Economic Adviser, 1969.

TABLE 30
ECONOMIC ADVISER'S ALL-INDIA INDEX NUMBERS OF WHOLESALE PRICES OF ALL COMMODITIES
(New Series)
(Base : 1961-62=100)

Month	1962	1963	1964	1965	1966	1967	1968	1969
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
January	...	102.3	111.0	127.0	135.2	155.2	165.7	162.7
February	...	102.8	112.3	124.4	134.8	158.6	162.7	161.7
March	...	104.4	111.3	122.6	136.8	159.4	159.7	164.8
April	...	106.3	113.9	123.9	139.6	160.4	163.0	163.1
May	101.2	107.8	115.8	125.4	142.9	163.5	163.7	166.5
June	102.6	107.8	118.3	126.6	145.6	168.2	162.9	171.7
July	103.2	108.7	120.7	129.8	148.0	172.8	163.3	174.2
August	104.6	109.9	123.3	132.7	150.1	171.2	170.0	174.2
September	106.1	110.3	125.3	132.3	147.6	172.5	173.5	173.9
October	105.5	110.8	125.7	132.0	149.0	173.3	171.3	171.1
November	106.7	110.8	124.2	134.6	150.2	170.1	165.8	168.5
December	103.3	110.5	125.7	134.7	152.0	166.6	162.3	169.9

Source : A Note on the Index Numbers of Wholesale Prices in India, *op. cit.*

Index Number of Wholesale Prices in Calcutta

The Department of Commercial Intelligence and Statistics, Ministry of Commerce and Industry, compiles this index. It is monthly and is published in the "Indian Trade Journal." The index is compiled from 69 items although formerly it contained 72 items. The 69 items are grouped in the following 16 groups.

TABLE 31
GROUPS CONSTITUTING THE INDEX NUMBER OF WHOLESALE
PRICES IN CALCUTTA

<i>Group</i>	<i>Number of items</i>
1. Cereals	8
2. Pulses	6
3. Sugar	3
4. Tea	3
5. Other food articles	9
6. Oilseeds	3
7. Oil mustard	2
8. Jute, raw	3
9. Jute manufactures	4
10. Cotton	2
11. Cotton manufactures	6
12. Other textiles (wool and silk)	2
13. Hides and skins	3
14. Metals	6
15. Other raw and manufactured articles	8
16. Building materials (teakwood)	1
Total	69

For each group a separate index is worked out along with one for all the groups. The base year is 1914. The prices refer to the wholesale prices prevailing at Calcutta. For each group the index number is calculated by taking the arithmetic average of the items included. Weighting is introduced indirectly by taking more than one quotations for important items in a group. Thus "Cereals" group includes 4 varieties of rice and only one each of wheat, barley, maize and oats.

The index numbers of wholesale prices of rice and wheat with agricultural year 1955-56 as base are compiled on a weekly basis by the Directorate of Economics and Statistics. Price quotations from 95 representative markets are utilized in respect of rice and 43 markets in respect of wheat. A simple arithmetic mean of the price relative for all the markets gives the index number of wholesale price for the commodity for the State while all-India index numbers are computed as weighted arithmetic mean of the State Index Numbers. The commodities included in the index vary from state to state depending upon the importance of the individual commodities in the different States.

Labour Bureau Index Number of Retail Prices (Urban Centres);

The Labour Bureau of the Ministry of Labour, Government of India used to compile and publish regularly monthly index numbers of retail prices for 18 centres in the urban areas. These indices were published in the "Indian Labour Gazette." The base year was 1944 and the series were unweighted.

The items for which the indices were published were divided into 3 main groups as follows :

1. All articles of food.
2. Fuel and lighting.
3. Miscellaneous.

The base year has now been changed to 1949. A simple price relative of certain selected articles of consumption only is published every month. The eighteen selected centres are distributed over the five states, Bombay (3) ; Punjab (1) ; U.P. (5) ; Bihar (1) ; and West Bengal (8).

Labour Bureau Index Number of Retail Prices (Rural Centres)

The Labour Bureau also compiles the index number of retail prices for 11 selected rural centres. Formerly in this case too, the base year was 1944 and the index was compiled on a monthly basis as unweighted average of the prices of items spread over the following four groups :

1. All food articles.
2. Fuel and lighting.
3. Clothing.
4. Miscellaneous.

Recently the base year has been changed to 1949 as in the case of urban centres. Also, instead of index numbers, price relative of commodities are published for these centres. These centres are wayside railway stations. Prices are collected through station masters, whose work is supervised by the Inspector of Railway Labour.

Index Number of Parity Between Prices Received and Prices Paid by the Farmers

Index numbers of parity between prices received and prices paid by the farmer are available for the States of Assam, Kerala, Orissa, Punjab and West Bengal. These index numbers suffer from a number of limitations which certainly vitiates inter-State comparability. The crop coverage of the indices of prices received is inadequate in a number of cases and may not be fully representative of the movement in prices received by the farmer, the basis of assignment of weights for the different commodities in the index of prices received also differs from State to State. In some cases, the weights are in proportion to the value of production during the base period. Similarly, in the index of domestic expenditure, the weights in most cases are based on family budget of a limited number of rural families which cannot be considered representative for the entire States. The retail prices utilized for the index of domestic expenditure are in many cases urban prices of a few markets only. The items included in the index of cost of cultivation and their weights are generally approximate, being based on data from a few farms.

With a view to effecting improvements in the existing series of index numbers and to enable other States to initiate these index numbers, the Technical Committee on Construction of Agricultural Index Numbers in India have reviewed the technical details and made far reaching recommendations for improvements in the scope, coverage and methodology of the existing series.

Consumer Price Index Numbers for Non-Manual Employees

Of late, the need for such a series was felt which may tell the changes in conditions and levels of living of the middle class population. In an effort to bridge the gap, the Central Statistical Organization conducted in 1958-59 a Middle Class Family Living Survey. This Survey covered nearly 36,000 families of non-manual employee in 45 cities and towns.

In 1964 the first volume of the report on the middle class family living survey was published which discussed the number, size, income distribution and expenditure of middle class families, employment and service conditions thereof. This report also discussed the origin, purpose, scope, design and organization of the Survey, schedules, concepts and definitions used, etc. In 1966, the second volume of the Report was published which discussed the food consumption and nutrition, health, education, housing and welfare of the middle class families. This was the first venture in this field attempted to cover so many concepts of the conditions and levels of living of any section of the population in the country. The Survey provided the basic material for deriving the weighting diagram needed for the construction of manual consumer price index numbers for non-manual employees in 45 selected urban centres.

The selection of the centres was made with due consideration to their administrative importance, middle class concentration and regional representation. The number of centres allotted were broadly according to the size of urban population of different States as in 1951. National and State Capitals and other large cities with a population of 5 lakhs and above had enjoyed the priority.

The index for these centres covered about 180 priceable items of goods and services and have been grouped into the following five main groups. These groups have been further divided into 23 sub-groups. The five main groups are as under :

1. Food, beverages and tobacco.
(Cereals ; pulses ; oils and fats ; meat, fish and eggs ; milk and milk products ; condiments and spices, vegetables ; fruits ; sugar ; non-alcoholic beverages ; prepared meals and refreshments, pan-supari and tobacco).
2. Fuel and light.
3. Housing.
4. Clothing and bedding ; footwear.
5. Miscellaneous.
(Medical care ; education and reading ; recreation and amusement ; transport and communication ; personal care and effects ; household requisites ; others, etc.).

Prices

For the purpose of construction of retail price index numbers,

prices are collected every month in respect of 180 items from 36 shops in Calcutta and Bombay, from 24 shops in each of the nine centres, viz., Hyderabad, Poona, Nagpur, Ahmedabad, Kanpur, Bangalore, Lucknow, Madras and Delhi-New Delhi. In each of the remaining centres, prices are collected from 12 outlets every month. In view of the growing importance of fair price shops and co-operative stores, price quotations are also collected from them in each centre where they exist and due representation given in the index of these quotations along with the open market prices.

Information on house rent is collected through a half-yearly survey of house rents. The survey covers on a repetitive basis, a fixed sample of dwelling (which varies from 60 to 240) occupied by middle class families subject to only occasional substitution from the reserve list.

Specifications have been fixed separately in respect of each item, outlet depending on availability; and identity of specifications maintained in each case as long as the specified variety is available. In cases of lapse, method of substitution for shops and other specification is made use of. This system facilitates coverage of more than one variety in respect of each item while maintaining comparability over time.

Base Period

The base period for this series is the calendar year 1960.

Methodology

According to the method adopted for calculation of index numbers for each centre, the price relative for each item is computed by chaining together a series of successive 'links' each representing the average change in the prices of the item as compared to the preceding month. Since January, 1968 the links and the price relatives are computed directly with reference to December, 1963.

In case of vegetables, fruits and pan leaf the price relatives are obtained by a straight comparison of the average price during the month under reference, with the average price during the base period.

The index for a sub-group is computed as a weighted arithmetic average of price relatives of the items included in the sub-group.

The index for a group is likewise computed as weighted arithmetic average of the sub-group indices and the overall index as a weighted arithmetic average of the group indices.

The All-India index is computed on the lines approved by the Technical Advisory Committee on Cost of Living Index Numbers as a weighted average of the centre indices with weights representing the aggregate expenditure of the middle class population which the centre indices are expected to serve.

Allotment of weights is made taking into account the following items :

- (a) The economic and administrative policies of a State.
- (b) Within a State, each selected centre is regarded as representing a sub-stratum of unspecified geographical demarcation but comprising of an equal share of urban middle class population in the State, excepting in the cities exceeding in size the pre-determined equal share of the sub-strata.
- (c) The population data of the 1961 census have been used for determining weights to be assigned at the stratum and sub-stratum levels. The proportion of middle class population in each stratum/sub-stratum has been estimated by using the occupational distribution of the employed population available from the results of the 14th round of the National Sample Survey as occupational distribution was available at the division level—(1) Professional, Technical and Related Workers ; (2) Administrative, Executive and Managerial Workers ; (3) Clerical and Related Workers ; and (4) sales workers, which have been regarded as broadly representing the middle class population satisfying the definition of non-manual activities.
- (d) The per capita expenditure of consumption as observed in the Middle Class Family Living Survey has been assumed to be valid for the entire sub-stratum represented by the Centre. The aggregate expenditure of middle class families in each sub-stratum is obtained as a product of the estimated middle class population and the assumed per capita expenditure. The aggregate expenditure at the state level is obtained by summing up the sub-stratum estimates.

Indices of Agricultural Production

THE FOLLOWING series are available for the index numbers of agricultural production in India ?

1. Ministry of Food and Agriculture Series.
2. The Eastern Economist Series.
3. F.A.O. Series.

A few common features of all the above series may first be noted. All indices are related to the gross production of crops obtained from the 'Crop Estimates' or the 'Area and Production of Principal Crops in India.' All indices are annual. Individual commodities are classified into groups and in addition to general index, group indices are also available in all the series. For every year, first, the provisional indices are calculated, based on production figures given in the final crop estimates. These are later revised when the revised crop Estimates become available next year. The formula used in the construction of all the above three index numbers is that of Laspeyres as given below :

$$P_{01} = \frac{p_1 q_0}{p_0 q_0}$$

where

P_{01} = Price Index Number of the current year.

p_1 = Current year price.

q_0 = Base year quantity.

p_0 = Base year price.

Foodgrains are included in all the series. The coverage for non-food crops varies slightly for different indices. The method of determination of weights is the same in the first two series. The F.A.O. method of determining weights is a little different. Various series are described below.

Ministry of Food and Agricultural Series

In 1949, a series of 'Index Number of Agricultural Production' covering 19 principal agricultural commodities for which estimates of production were then available was initiated with the quinquennium ending 1938-39 as the base. In view of the extended number and coverage of the crop estimates during later years, a revised series of Index Numbers has been constructed with the base 1949-50. The Index which in the earlier years covered 26 commodities, now covers 28 crops divided into two main groups and six sub-groups. The crops are :

(a) Foodgrains :

(i) Cereals—

Rice, jowar, bajra, maize, ragi, wheat, barley and small millets.

(ii) Pulses—

Gram, tur, other pulses.

(b) Non-foodgrains :

(i) Oilseeds—

Groundnut, sesamum, rape and mustard, linseed, castor seed.

(ii) Fibres—

Cotton, jute, mesta.

(iii) Plantation crops—

Tea, coffee, rubber.

(iv) Miscellaneous crops—

Sugarcane, pepper, tobacco, potatoes, ginger, chillies.

In principle, the index of agricultural production should cover

all agricultural crops and also livestock products. But as reliable annual estimates of production of minor crops and livestock products are not available, the present series has been confined to 28 crops listed above. Efforts are being made to obtain regular and reliable estimates of production of as many additional agricultural commodities as possible and the question of inclusion of more commodities in the Index is to be reviewed quinquennially.

The year 1949-50 has been chosen as the base period for the Index Number on the following grounds :

- (a) It was a relatively normal year in recent years for agricultural production, especially food production. It has been adopted as the base year in the First Five Year Plan for food. The years 1950-51 and 1951-52 were characterized by drought and consequent fall in food production and were not normal.
- (b) The average price level during the agricultural year July 1949 to June 1950 was also relatively normal at least so far as agricultural commodities in India were concerned and was unaffected by the Korean boom on account of the usual time-lag and corrective action taken by the Government of India.
- (c) The official and crop-cutting estimates of production of food-grains in 1949-50 were very close to each other and as such the official estimates of production are comparatively free from any bias of under-estimation.

It is true that a period of three or five years would have been better as a base period, but as no such suitable period could be selected which was not very seriously affected by adverse conditions, the present series has been based on a single year's production.

Method of construction of index numbers

To provide for changes in the estimates of production of commodities resulting from extension in the geographical coverage of the crop and from variations in the methods of estimation, the Index Numbers are constructed by the chain base method by utilizing pairs of comparable figures for each two successive years. For each crop, the all-India production during a year has been expressed as a production relative with the corresponding production in the preceding year as base. These production relatives for each crop have been linked to the production in the base period through the interven-

ing chain relatives to give the production index for that crop. The weighted arithmetic average of these production indices has been taken to represent the sub-group, the group and the general all-commodity Index Numbers.

Weights

Weights are assigned to the commodities in proportion to the total value of production of each during the base period. Production is evaluated at the annual harvest prices prevailing during the year. In a few cases where reliable harvest prices are not available, the average wholesale prices are utilized with appropriate allowances wherever necessary. The weights allotted to each commodity, sub-group and group are given in Table. 32.

The assumptions made in the method adopted are :

- (i) That the variation in production in the non-reporting areas is the same as that in the reporting areas in the aggregate.
- (ii) The variation in figures of production based on the new method of estimation is the same as in the figures based on the old method of estimation.

The practical application of (ii) above will require that for the transitional year, when the method of estimation undergoes a change, production figures should be made available on the basis of the new as well as the old methods. In cases where these are not available, comparable estimates have been utilized, after making due allowances for the changes in coverage. Such cases have, however, been rare.

TABLE 32
WEIGHTS FOR PREPARING INDEX NUMBERS OF AGRICULTURAL
PRODUCTION IN INDIA

<i>Commodity/Group</i>	<i>Weight</i>
I. FOODGRAINS :	
(a) <i>Cereals—</i>	
(i) <i>Kharif</i>	
Rice	35.3
Jowar	5.0
Bajra	2.7
Maize	2.1
Ragi	1.2

<i>Commodity/Group</i>	<i>Weight</i>
Small Millets	1.5
Kharif Cereals	47.8
(ii) Rabi	
Wheat	8.5
Barley	2.0
Rabi Cereals	10.5
Cereals	58.3
(b) Pulses—	
Gram	3.7
Tur	1.1
Other Pulses	3.8
Pulses	8.6
FOODGRAINS	66.9
II. NON-FOODGRAINS :	
(a) Oilseeds—	
Groundnut	5.7
Sesamum	1.2
Rape & Mustard	2.0
Linseed	0.8
Castor seed	0.2
Oilseeds	9.9
(b) Fibres—	
Cotton	2.8
Jute	1.4
Mesta	0.3
Fibres	4.5
(c) Plantation crops—	
Tea	3.3
Coffee	0.2
Rubber	0.1
Plantation Crops	3.6
(d) Miscellaneous crops—	
Sugarcane	8.7

<i>Commodity/Group</i>	<i>Weight</i>
Tobacco	1.9
Potato	1.0
Pepper	1.2
Chillies	2.0
Ginger	0.3
Miscellaneous Crops	15.1
NON-FOODGRAINS	33.1
ALL-COMMODITIES	100.0

The Index Numbers should be based on the revised estimates of production issued in the crop forecasts from time to time. However, since these estimates are available only in the forthcoming year, the Index Numbers for the current year are provisionally based on final forecast figures for the current year; the revised estimates for the previous year are, however, utilized for the next year. For example, the Index Number for the current year 1953-54 is linked through the revised estimates for 1952-53 available in 1953-54 and the revised estimates for 1951-52 available in 1952-53, in case the geographical coverage of the two forecasts remains the same. Otherwise, suitable adjustments are made for changes in coverage.

Concept of production

The concept of production utilized in the series is essentially that of gross production of crops, no allowances being made for seed or wastage. It may be added that the F.A.O. Series of Index Numbers of Agricultural Production are also essentially based on gross output but quantities of crops, milk and skimmed milk utilized as animal feed, whether they come from domestic or imported sources are deducted. This is done to avoid double counting which would occur if foodgrains credited to the food crop production are fed to livestock and the resultant livestock products are included on a gross basis in the Index. However, presently livestock products are not included in the Production Series.

Area and productivity Indices

For a study of trends in area under crops and agricultural productivity over time, all-India index numbers of area under crops

and agricultural productivity were issued for the first time in August 1962 with the same base and coverage as for the index of agricultural production. The States were also asked to construct similar index numbers. In connection with the study of growth rates, a review was made of the State index numbers. Such indices are now available for most of the States according to the revised series finalized by the States. Salient features of all-India and State series of index numbers are discussed below.

All-India Series

Area under crops. In pooling together the acreage under different crops for calculating the index numbers for sub-groups, groups and all crops, no explicit weightage has been given. The sub-group and all-crop indices have been worked out directly from the area under them. There is thus implicit weighting in proportion to the area under individual crops to the total area under all crops in the base year.

Agricultural Productivity. The crop, sub-group, group and all-crop indices of productivity are obtained by dividing the index of production by the corresponding index of area.

Method of Construction. The changeover during the last decade or so from the traditional method of reporting area and production of crops to the method of complete enumeration in the case of area and to crop-cutting survey method for estimation of yield, and, also the increase in reporting area have taken place progressively in respect of different crops in different States. To provide for these changes in coverage and methods of estimation, the index numbers of area under crops like those on production have been constructed by the chain-base method.

State Series

In 1955, the States were asked to undertake construction of index numbers of agricultural production following essentially the same concepts, definitions and methodology as adopted in the all-India series. It was observed in 1960 that while the States generally followed the concepts and methodology as adopted by the Ministry of Food and Agriculture for the all-India series, there were a number of variations in regard to the choice of the base period, coverage, method of construction etc., which vitiated inter-State comparability of the

indices. Accordingly, broad criteria governing the selection of crops for inclusion in the index, method of construction and weighting were supplied to the States in June 1961 for their guidance. In the light of these criteria, the States started revising their series of index numbers of agricultural production gradually. Index numbers of area under crops, agricultural production and agricultural productivity are now available for all the States except Jammu & Kashmir. Among the Union Territories, they are available for Himachal Pradesh.

Base Period. One of the criteria for selection of the base period for the State series was that it should be a year subsequent to States' Reorganization, so that the indices would be based on the data according to the reorganized set-up of the States. Of course, it was, as far as possible, to be a normal year from the point of view of agricultural production and prices. Accordingly, the agricultural year 1956-57 was chosen for adoption as the base year for all the State series. All the States except Rajasthan, Orissa and West Bengal have constructed their revised series of index numbers with this year as base. Rajasthan has the quadrennium ending 1955-56 as the base. Orissa and West Bengal have 1952-53 and 1949-50 respectively as base periods.

Coverage. Some of the crops covered by the all-India series are not included in the series of some States; this is because of their being unimportant in those States. Similarly, certain crops not included in the all-India series are included in some of the State series, because they are important in these States. The crops covered account for between 80 per cent of the gross-cropped area in Punjab to 95 per cent in Assam and Gujarat and 97 per cent in Himachal Pradesh. As in the case of the all-India series, the commodities included in the State series are divided into two main groups, *viz.*, foodgrains and non-foodgrains. These are further sub-divided into different sub-groups depending upon their importance in each State.

Weighting and Method of Construction. The method of weighting and of construction of the State indices is practically the same as that for the all-India series. All States follow the chain-base method, except Gujarat and West Bengal who follow the fixed-base method. In all States annual harvest prices are used for estimating the value weights for production indices.

Adjustments made in the State Series. The most important adjustment is that all the State index numbers have been brought on to a uniform base year, viz., 1956-57. This has necessitated the shifting of the original base of the State series of Rajasthan, Orissa and West Bengal to 1956-57, keeping their weights the same as in the original series. Another step that has been taken is to present the index numbers for the years both prior and subsequent to 1956-57, so as to provide a time series for a uniform period of 10 years for all the States. For this purpose it became necessary in the case of Kerala, whose series of index numbers of agricultural production with 1956-57 as base was available only for the period from 1956-57 onwards, to link the 1956-57 series with the State's earlier series with 1952-53 as base. In this linking the weights assigned to the series with 1956-57 as base were adopted for the years prior to 1956-57 also.

In the absence of the State series on index numbers of area under crops and agricultural productivity in the case of the States of Andhra Pradesh, West Bengal, Uttar Pradesh, Kerala and Mysore, these have been constructed in the Directorate on the basis of the latest available data. Some useful data on the Index numbers of area, production and productivity are shown in Appendix 14.

Eastern Economist Index

The Eastern Economist is a private weekly economic publication. The Index Number of agricultural production was first published in its special budget number of 1952-53 and again in 1953-54 but since then they are published in its weekly issue for the week ending July 31st each year.

The base period for this series is triennium, ending 1938-39 = 100. This series is available from 1939-40. It is worked out on the fixed-base method. It does not make allowance for the changes in coverage as well as methods of estimation in working out series. This index is also obtained as a weighted average; the weights being proportional to the values of the commodities produced during the base period. This series is much restricted in scope and covers 14 commodities. The commodities included and their various groups are given below:

Foodgrains	: rice, wheat, millets, gram.
Fibres	: cotton, jute.

Oilseeds : sesamum, groundnut, rape and mustard, linseed.

Miscellaneous : sugarcane, tobacco, tea, coffee.

The FAO Index

The Food and Agricultural Organization of the United Nations is compiling and publishing index numbers of agricultural production for various countries, including India. These are published in the FAO Year Book. The base period for the Indian index is 1936-38. The index number relates to gross production of a large number of commodities, divided in 11 groups. These groups are: grains, starchy roots, sugar, pulses, oil crops, nuts, fruits, vegetables, livestock and livestock product, fibres and others. Crops and milk used as feed in livestock production are deducted to avoid double counting. In addition, allowances are made for seed.

The weighting system adopted is fairly complicated. The commodity weights are world prices. These commodity weights are calculated in terms of gold francs per metric ton and then converted to wheat relative price—the price of wheat being 100 gold francs per metric ton in 1936-38. Weights are assigned on the basis of such commodity prices expressed in terms of wheat. The world prices are used in the preparation of index numbers to make possible international comparisons.

Other Statistics

BESIDES THE various types of statistics dealt with in the preceding chapters, the following statistics are discussed in this chapter :

1. Number and size of cultivator's holdings.
2. Details of ownership and tenancy.
3. Composition of agricultural population.
4. Agricultural wages.
5. Agricultural machinery and power.
6. Consumption.
7. Marketable surplus.
8. Stocks.
9. Seed and feed requirements.
10. Production economics.
11. Rural credit.
12. Agricultural trade.

Number and size of cultivator's holdings

The data on holdings can be built from the village records maintained in the temporary settled areas. The NSS Survey of Agricultural Holdings in their Eighth Round, the Agricultural Labour

Enquiry, the All India Rural Credit Survey, the Farm Management Investigations and the Akola Survey into the Cost of Production provide partial information. The NSS data give the All-India and regional picture but do not go below that level.

A second survey of the land holdings has again been conducted by the Directorate of National Sample Survey in response to the FAO Agricultural Census, 1960. It was conducted during the 16th Round (July 1960—August 1961) with the object to study the structure, distribution and utilization of agricultural holdings. The design of the survey was a stratified two-stage one where the villages were the first stage units and households the second one. In the schedules adopted there was provision for the collection of information on the following items :

1. Holder, holding and tenure particulars giving details of area owned, area leased in and leased out, terms of leasing in and leasing out, etc.
2. Land utilization patterns.
3. Area under crops.
4. Demographic particulars of the members of the sample households.
5. Irrigation and drainage facilities on the farm.
6. Use of fertilizers and soil dressings.
7. Number of livestock and poultry and agricultural implements and machinery.

The Survey was repeated during the 17th Round (September 1960—July 1962) of the National Sample Survey. The coverage of the survey in this round was extended to the urban areas also. These surveys were arranged to build up valid estimates for the 47 homogeneous agricultural regions of the country. But the demands of micro-level of planning are more comprehensive. Even a realistic planning at the macro-level is not possible without this basic data at the village or at least the block level.

In the course of his technical address to the Fourteenth Annual General Meeting of the Indian Society of Agricultural Statistics, 1961, Dr. Lokanathan observes : "A complete enumeration on some aspects of holding (information on irrigated areas and sources of irrigation, extent of double cropping, number of plots or fragments in the holding, details of livelihood and farm labour, etc.) could be conducted quinquennially by combining it with the Livestock Census. Some

TABLE 33
OPERATIONAL HOLDINGS, OWNERSHIP HOLDINGS BY SIZE CLASS

Sl. No.	Holding Size (Hectares)	16th and 17th Round (Pooled)			17th Round			
		Operational			Ownership			
		Number (In thousand)	Percentage to total	Area (Thousand hectares)	Number (In thousand)	Percentage to total	Area (Thousand hectares)	Percentage to total
1.	Below 0.20	4,838	9.71	464	19,005	29.70	701	0.54
2.	0.20 to 0.40	4,255	18.25	1,245	4,574	36.85	1,348	1.59
3.	0.40 to 1.01	10,772	39.87	7,284	11,484	54.79	7,715	7.59
4.	1.01 to 2.02	11,181	62.31	16,224	10,984	71.95	15,945	19.99
5.	2.02 to 3.04	6,158	74.67	14,979	6,007	81.34	14,886	31.56
6.	3.04 to 4.05	3,478	81.65	11,947	3,310	86.51	11,540	40.53
7.	4.05 to 6.07	3,881	89.44	18,569	3,685	92.27	17,969	54.50
8.	6.07 to 8.09	1,843	93.14	12,582	1,793	95.07	12,427	64.16
9.	8.09 to 10.12	1,111	95.37	9,668	1,094	96.78	9,774	71.76
10.	10.12 to 12.14	663	96.70	7,165	622	97.75	6,852	77.09
11.	12.14 to 20.23	1,121	98.97	16,569	1,005	99.32	15,160	88.87
12.	20.23 & above	523	100.00	15,748	437	100.00	14,317	100.00
13.	All sizes	49,824		132,444	64,000		128,634	

Source : N.S.S. Report No. 144—Seventeenth Round, September 1961—July 1962.

of the important items are already included in the Livestock Census and extension of its scope will be worth the additional trouble and expense. Information on some of these items would be needed both in respect of ownership as well as operational holdings." The available data on operational and ownership holdings by size class are as in Table 33.

Ownership and Tenancy

Details of ownership and tenancy are available with a fair degree of accuracy from the village records and other revenue settlement records. A large scale change in the pattern of ownership and tenancy is taking place in most of the States on account of land legislation measures, like zamindari abolition, ceilings on holdings and consolidation of land-holdings. There is need to process and analyse the data already available in a comprehensive form.

TABLE 34
CLASSIFICATION OF WORKERS, 1961 AND 1951—ALL-INDIA

Classes of Workers	1961		1951	
	Total workers (millions)	Percentage to total workers	Total workers (millions)	Percentage to total workers
(1)	(2)	(3)	(4)	(5)
Cultivators	99.5	52.8	69.8	50.0
Agricultural labourers	31.5	16.7	27.5	19.7
Total Agricultural Classes	131.0	69.5	97.3	69.7
Mining, Quarrying, Livestock, Forestry, Fishing, Hunting and Plantations, Orchards and Allied activities	5.2	2.8	4.1	3.0
Household Industry	12.0	6.4	N.C.	...
Manufacturing other than household industry	8.0	4.2	12.4	9.0
Construction	2.1	1.1	1.5	1.1
Trade and commerce	7.6	4.0	7.3	5.2
Transport, storage and communications	3.0	1.6	2.1	1.5
Other services	19.5	10.4	14.6	10.5
Total workers	188.4	100.0	139.5	100.0

N.C.—Not collected separately.

Source: Census of India, Paper No. 1 of 1962.

Agricultural Population

The data on characteristics and composition of agricultural population are collected during the Population Census once every ten years. It provides information regarding the total number of persons engaged in agricultural and other occupations (Table 34). Some detailed information about agricultural labourers regarding their employment and standard of living has also been made available by the Agriculture Labour Enquiries.

Agricultural Wages

Statistics about agricultural labour and wages used to be collected through a quinquennial wage census carried out in certain States. Reliable estimates of agricultural wages have assumed a great importance in view of the development programmes in the field of agriculture. Besides the Agriculture Labourer Enquiry which gives a fairly detailed idea of agricultural wages in India, regular data on agricultural wages for different categories of labourers and types of operations, are being collected since 1948 for some selected centres in the country and published in 'Indian Agricultural Wage Statistics'. The utility of this publication is limited. Firstly, it is restricted to only a few selected centres in the various States. Secondly, there is no uniformity as to the meaning of "most common wage rate" and the coverage is also not complete. Rajasthan, Jammu and Kashmir, Manipur and Delhi States do not collect such data at all.

A scheme has now been formulated by the Directorate of Economics and Statistics, Ministry of Food and Agriculture for an improvement in the system of collecting statistics of wages of agricultural labour. Some data on wages are also available from Farm Management studies and the follow up Indicator Scheme.

Agricultural Machinery and Power

'The quinquennial livestock census' is the only source of regular information about agricultural machinery and implements. The available information from the 1956 Livestock Census is given in the Statistical Tables appended. Some changes have been introduced from Census to Census as discussed earlier. Information about *ghanies* (indigenous oil presses) was included for the first time in 1951. Statewise data in this respect have been provided in Tables 35 and 36.

TABLE 35
NUMBER OF AGRICULTURAL MACHINERY AND IMPLEMENTS IN INDIA ACCORDING TO
LIVESTOCK CENSUS, 1961

States	Census year	Ploughs		Carts	Sugarcane crushers worked by		Oil engine pumps for irrigation purpose	Electric pumps for irrigation purpose	Persian wheels or rakhals	Tractors		Chaxies	
		Wooden	Iron		Power Bullocks					Government	Private	Five or more	Less than five
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Andhra Pradesh	1961	3,120,105	50,881	1,221,016	3,395	26,774	33,940	17,024	26,472	391	1,371	6,826	3,859
	1956	2,997,463	24,064	1,160,500	1,216	22,411	16,771	3,220	N.C.	549	1,077	8,853	4,711
Assam	1961	1,225,674	2,190	135,386	—	11,019	76	61	—	489	—	787	1,566
	1956	1,144,038	3,130	99,686	279	11,086	74	302	N.C.	49	110	888	1,163
Bihar	1961	3,861,683	148,430	692,236	3,748	37,852	3,187	1,930	22,717	173	1,347	5,110	32,480
	1956	3,744,927	104,938	625,373	4,427	41,795	2,904	749	N.C.	97	1,130	7,876	39,615
Gujarat	1961	1,459,616	105,848	708,767	2,033	4,307	44,992	6,229	23,922	217	1,788	3,277	823
	1956	1,266,636	63,394	612,297	1,330	2,602	19,270	1,140	N.C.	65	759	4,364	1,350
Jammu & Kashmir	1961	439,318	24,694	829	—	1,346	20	21	238	35	97	1,440	1,715
	1956	406,209	14,364	845	32	1,182	22	9	N.C.	99	997	2,192	2,046

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Kerala	1961	562,231	6,441	21,037	175	1,071	3,372	2,565	24,044	119	157	2,058	2,164
	1956	570,327	10,225	27,283	230	1,155	2,504	723	N.C.	19	168	1,858	2,366
	1961	4,897,386	54,976	1,954,163	654	16,059	9,681	2,228	89,312	402	1,623	5,009	23,152
	1956	4,379,184	30,810	1,699,612	376	16,318	5,464	276	N.C.	286	1,025	5,362	30,205
Madras	1961	3,223,259	206,843	664,544	7,384	16,325	36,832	98,481	1,081	118	1,269	9,692	3,599
	1956	2,850,860	77,211	639,805	2,018	13,352	29,761	23,968	N.C.	287	535	12,556	5,519
Maharashtra	1961	1,673,499	397,905	1,343,378	7,155	8,648	63,747	6,530	15,751	207	1,250	3,886	1,722
	1956	1,564,527	333,369	1,238,911	4,802	9,387	26,715	2,108	N.C.	615	1,704	6,612	3,284
Mysore	1961	2,267,144	228,373	693,756	2,830	13,063	10,087	12,433	25,171	183	798	2,677	1,140
	1956	2,103,545	161,198	654,112	1,729	11,739	5,628	5,481	N.C.	274	533	3,473	1,241
Orissa	1961	2,278,471	11,112	612,057	736	12,183	1,203	129	7	57	137	4,967	4,522
	1956	2,075,577	14,396	444,738	3,056	9,512	866	70	N.C.	16	79	4,018	6,351
Punjab	1961	1,472,129	478,303	639,297	2,111	91,534	8,158	8,774	174,605	330	7,536	2,540	849
	1956	1,574,557	280,398	468,161	606	78,134	5,057	6,839	N.C.	144	3,665	3,224	790
Rajasthan	1961	2,272,357	73,879	709,893	87	16,275	2,434	477	37,686	387	2,809	9,353	3,311
	1956	2,074,360	23,988	590,594	494	13,078	1,317	342	N.C.	99	1,175	10,115	3,931
Uttar Pradesh	1961	7,222,500	496,911	2,122,234	2,334	325,359	3,408	2,969	139,837	416	6,723	14,536	84,158
	1956	6,424,108	227,724	1,890,302	2,678	306,156	4,621	1,698	N.C.	471	5,358	17,259	101,196
West Bengal	1961	2,141,578	4,185	727,725	58	5,291	3,637	256	13,420	91	239	5,027	6,700
	1956	2,575,724	3,128	779,906	63	5,746	1,379	97	N.C.	156	294	7,273	7,833

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Delhi	1961	14,295	2,932	7,385	11	180	123	68	5,820	54	204	37	5
	1956	38,573	1,564	18,540	64	599	134	10	N.C.	16	116	50	10
Himachal Pradesh	1961	232,721	3,278	1,412	24	656	6	2	23	1	3	287	384
	1956	219,873	59	1,318	4	502	6	2	N.C.	1	2	273	537
Manipur	1961	104,125	673	16,477	65	1,963	13	—	—	7	4	178	13
	1956	66,333	1,575	15,654	—	1,139	5	—	—	3	3	—	132
Tripura	1961	100,745	52	746	—	295	23	—	—	13	—	1	693
	1956	63,095	627 ^c	458	—	149	13	—	N.C.	5	2	92	72
Andaman & Nicobar Islands	1961	3,001	9	52	—	12	3	1	N.C.	1	—	4	1
	1956	2,475	17	75	—	18	—	—	N.C.	2	—	—	—
Laccadive, Minicoy & Amindivi Islands	1961	—	—	—	—	—	—	—	—	—	—	—	—
	1956	—	—	—	—	—	—	—	—	—	—	—	—
ALL INDIA	1961	38,371,787	2,298,215	12,072,390	33,800	590,217	229,972	160,163	600,106	3,591	27,325	77,691	172,032
	1956	38,142,391	1,376,099	10,968,100	63,304	545,080	122,511	47,034	N.C.	3,253	17,762	96,338	212,166

TABLE 36
NUMBER OF AGRICULTURAL MACHINERY AND IMPLEMENTS, 1966—STATEWISE
(in thousands except where otherwise stated)

State/Union Territory	Ploughs (wooden & steel)	Sugar-cane cutters (in unit)	Oil En- gines (in unit)	Electric pumps (in unit)	Tractors (in unit)	Fishing and Carrier		
						Fishing Boats (in unit)	Boats worked by power (in unit)	Fishing Nets (in thousands)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Andhra Pradesh	3,292	27,459	46,741	57,225	2,911	23,135	702	232
Assam	1,429	9,794	362	22	834	31,711	4,486	528
Bihar	4,017	48,298	3,698	6,854	2,132	12,399	279	296
Gujarat	1,585	4,777	112,428	14,729	3,248	3,948	1,034	111
Haryana	731	13,488	3,658	12,230	4,850	5	—	(a)
Jammu & Kashmir	518	2,000	18	115	104	1,635	N.A.	4
Kerala	493	1,446	6,824	4,869	418	27,496	715	197
Madhya Pradesh	4,599	19,837	16,511	6,116	2,513	9,026	139	334
Madras	3,772	20,703	42,852	208,465	3,278	20,026	210	144

Maharashtra	2,220	17,694	146,786	37,979	3,274	10,264	1,794	250
Mysore	2,553	22,076	24,575	27,054	2,595	9,442	1,603	183
Nagaland	N.A.	N.A.	N.A.	N.A.	9	N.A.	N.A.	N.A.
Orissa	2,803	18,324	710	189	667	17,796	360	405
Punjab	1,333	91,991	25,670	20,233	10,646	22	—	1
Rajasthan	2,506	16,970	7,232	4,954	4,195	193	1	2
Uttar Pradesh	8,484	383,916	28,146	10,197	10,139	10,835	102	135
West Bengal	2,427	5,730	4,162	629	1,548	1,533	—	19
Union Territories	629	4,933	677	2,730	624	16,713	64	867
All India	43,491	685,456	470,563	414,610	54,612 ¹	196,179	11,489	3,653

1. Includes 127 Tractors in respect of Goa, Daman & Diu.

N.A.—Not available. (a) Less than 500.

It was further divided according to capacity in 1956 into the following categories :

- (a) Five kilos and more.
- (b) Less than 5 kilos.

The Indian Central Oilseeds Committee, published a leaflet, 'Power Oil milling Industry—1954-56'. It supplies State-wise information about the number of oil mills, number of crushing machinery installed in the different oil mills, seed-wise break-up of the quantities of oilseeds crushed, oils and oilcakes produced in the mills.

Statistics of number of agricultural machinery and implements are collected through the quinquennial livestock census organized by the Directorate of Economics & Statistics. Separate data are available in respect of ploughs—wooden and iron improved harrows or cultivators, improved seed drills, improved threshers, rotary chaff cutters, sprayers and dusters, carts, sugarcane crushers worked with power and bullocks, oil engines with pumps for irrigation purposes, electric pumps for irrigation purposes, persian wheels, tractors—Government and private, power tillers and ghanis—five kilograms and over and less than five kilograms.

The coverage of implements in the Livestock Census is not quite comprehensive. There are about 22-25 types of agricultural implements in use in the country for different types of operations, but the census covers only a few of them.

Consumption

There is practically a complete lack of information about the quantity of food and various other items being consumed by people in the different income groups in the various parts of the country. Besides stray inquiries conducted by individuals or institutions, an all-India picture is nowhere available. The whole work has been entrusted to the National Sample Survey. Unfortunately the data provide information only about the total expenditure distribution in monetary terms. (Table 37). Since most of the items of consumption are of different qualities and their prices vary not only from quality to quality but from place to place, this type of data are of little utility for any kind of perspective planning in the country. The other defect in the NSS method is that all this infor-

mation is being collected by the inquiry method and at a particular point of time in the year. It is very difficult to get at the correct answers and accurate information about the quantity of a particular item consumed by a person—more so when the person who answers these inquiries does not maintain any type of personal accounts. Some quantitative data have now been given in the draft report of the 17th and 18th rounds.

TABLE 37

PATTERN OF CONSUMER EXPENDITURE

Consumer expenditure in Rupees per person for a period of 30 days by items of consumption—All-India (based on National Sample Survey data).

Item	16th round July 1960— August 1961		17th round Sept. 1961— July 1962		18th round February 1963— January 1964	
	Rural	Urban	Rural	Urban	Rural	Urban
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Cereals & cereal						
substitutes	8.55	6.90	8.69	7.24	9.05	7.36
2. Milk & milk						
products	1.62	2.79	1.46	2.95	1.61	3.08
3. Edible oil	0.59	1.10	n.a.	n.a.	n.a.	n.a.
4. Meat, egg & fish	0.53	1.02	n.a.	n.a.	n.a.	n.a.
5. Sugar	0.61	0.91	n.a.	n.a.	n.a.	n.a.
6. Salt	0.05	0.05	n.a.	n.a.	n.a.	n.a.
7. Other food	2.63*	5.20*	3.85*	7.64*	4.01*	8.21*
8. Food total	14.58	17.97	14.90	18.73	15.67	19.65
9. Clothing	1.82	1.80	1.94	2.11	1.82	2.08
10. Fuel & light	1.25	1.80	1.36	1.95	1.48	2.08
11. Rent	0.03	1.15	—	—	0.05	1.36

(1)	(2)	(3)	(4)	(5)	(6)	(7)
12. Taxes	0.03	0.08	—	—	0.04	0.19
13. Miscellaneous	3.76	6.72	3.43	8.41	3.25	7.60
14. Non-food total	6.89	11.55	6.73	12.47	6.64	13.31
15. Total	21.47	29.52	21.63	31.20	22.31	32.96
No. of sample						
households	3762	2568	7173	5226	21776	4296
Average household						
size	5.00	4.30	5.12	4.65	5.15	4.59

Sources : 16th, 17th and 18th round : draft reports Nos. 139, 145 and 166.

n.a.—not tabulated separately.

*Includes pulses and products for 16th round and excludes items (3 to 6) ; for 17th round includes items 3 to 6 but not pulses ; for 18th round includes items 3 to 6 but excludes pulses and products.

Note.—Available per capita estimates of consumption of pulses and products for the three rounds are :

16th round : pulses : rural as well as urban Re. 0.84

17th round : pulses : rural as well as urban Re. 0.90.

18th round : pulses & products : rural as well as urban Re. 1.00.

Consumption habits of the people vary from season to season. Unless the surveys are spread out according to these observed variations in the consumption habits which might be different in different parts of the country, the results are not likely to be of much practical utility.

Comprehensive data are available about food consumption pattern of agricultural labourers in the two Agriculture Labour Enquiries. A number of enquiries have also been conducted by various organisations about food consumption pattern of urban people. One such enquiry was instituted by the Government of India to compute cost of living indices for the industrial areas in the country.¹ These investigations covered as many as 27 thousand budgets. As in the case of National Sample Survey, they also contained information about the actual expenditure of a family on various items of food as well as different cereals. Quantity of different cereals consumed were also given in a few cases. Similarly a very comprehensive enquiry was undertaken by the Government of Bombay in respect of the Industrial Labour at Bombay, Ahmedabad and Solapur. Another such study was conducted by Dr. B. Natarajan in Madras among the labouring classes.

The Indian Council of Medical Research have also been conducting case studies of family budgets of different types of people. Their report No. 22 published the results of 841 diet surveys conducted by them in the different parts of the country during the period 1938-1948. These surveys have since been continued and their results are available in the various reports of the Council. A number of similar survey have also been carried out by the Indian Statistical Institute, Calcutta, the Punjab Board of Economic Enquiry, the Agro-Economic Research Centres, the Governments of Haryana and U.P. as well as a number of individual research workers in the different universities from time to time.

Marketed Surplus

The quantum of marketed surplus, and the pattern of its disposal is changing with the economic development of the country. Some scattered and sketchy information on this aspect is available in the Marketing Reports. Besides the fact that there is practically no scientific basis behind these figures, they can at best give an idea of the position as it existed when the particular Report was being prepared. Changes

1. The Rau Court of Enquiry which investigated the dispute about dearness allowances on the GIP Railway raised the necessity of constructing reliable cost of living indices for urban, semi-urban and even rural areas. The first family budget investigation was started in Bangalore at Howrah and Bareilly in July 1943 and the enquiry was completed in about three years.

in this respect are taking place rapidly. All types of planning about transport, storage and even reserve stocks, etc., depends upon the accuracy of information of this nature.

During the 1958-59 season when the market prices of foodgrains were on the whole found to be not in keeping with the level of production obtained in the year, the Directorate of Economics and Statistics, Ministry of Food and Agriculture conducted a special inquiry through the Agro-Economic Research Centres and the Farm Management Centres, to have an idea of the market arrivals of foodgrains during the 1958-59 season. The Report entitled 'Report on Market Arrivals of Foodgrains—1958-59 Season' was published towards the end of 1959.

Based on the information supplied by their Marketing Inspectors, spread all over the country, the Directorate is also publishing in the various issues of their Monthly Journal 'Agricultural Situation' data about market arrivals of different foodgrains. Table 38 gives data on arrivals of wheat from villages to assembling

TABLE 38
ARRIVALS OF WHEAT FROM VILLAGES INTO
ASSEMBLING MARKETS

<i>States</i>	<i>Market arrivals as percentage of production during</i>				
	<i>1960-61</i>	<i>1965-66</i>	<i>1966-67</i>	<i>1967-68</i>	<i>1968-69</i>
(1)	(2)	(3)	(4)	(5)	(6)
Andhra Pradesh	21.3	23.9	58.4	41.0	N.A.
Bihar	6.9	33.7	17.2	37.5	N.A.
Gujarat	21.8	32.4	31.1	39.2	N.A.
Haryana	N.A.	21.9	21.6	22.2	24.0
Madhya Pradesh	21.3	15.8	13.7	22.2	20.8
Maharashtra	24.5	33.2	54.8	51.2	N.A.
Mysore	45.8	42.1	29.6	42.2	N.A.

(1)	(2)	(3)	(4)	(5)	(6)
Punjab	31.6*	32.8	31.8	31.2	45.8
Rajasthan	20.6	13.2	19.8	18.3	33.3
Uttar Pradesh	11.2	13.1	11.8	17.2	28.6
Delhi	48.5	23.2	23.6	35.1	N.A.
Himachal Pradesh	0.4	0.8	0.2	0.4	N.A.
Total	19.85	20.42	19.80	23.81	N.A.

N.A.—Not available.

*Relates to the set-up as on 31-10-66.

Source : Indian Agriculture in Brief, 1970.

markets. Estimates of marketed surplus of wheat for the important wheat growing States is also being published.

Stocks

Data on stocks and reserves of foodgrains relate only to Government stocks and off-take from the same. This is published annually in the 'Bulletin on Food Statistics,' since 1949. The position before that year is given in the 'Indian Food Statistics, 1949.'

As regards cash crops like cotton, jute, etc., information is also available on stocks held by trade. Annual Balance Sheets of some of the important commodities are being published by the Directorate of Economics and Statistics in their 'Commodity Series.' Tables 39 and 40 provide the necessary data regarding Cotton and Jute.

TABLE 39
 PRODUCTION, CONSUMPTION, IMPORTS, EXPORTS AND
 CARRY-OVER STOCKS OF COTTON*

(Million bales of 180 kg. each)

Year (September to August)	1960-61	1965-66	1966-67	1967-68	1968-69
(1)	(2)	(3)	(4)	(5)	(6)
Opening stocks with mills only	1.36	1.80	1.65	1.39	1.58
Home production (Trade estimates)	5.63	5.61	5.31	6.54	6.02
Imports	1.10	0.53	0.78	0.83	0.55
Total	8.09	7.94	7.74	8.76	8.15
Mill consumption	5.38	5.82	5.76	6.17	6.20
Household consumption	0.27	0.27	0.27	0.27	0.27
Exports	0.30	0.18	0.24	0.24	0.20
Carry-over stock (estimated)	2.14	1.67	1.47	2.08	1.48

*Based on trade estimates

TABLE 40
 PRODUCTION, CONSUMPTION, IMPORTS AND EXPORTS OF
 RAW JUTE AND MESTA

(Million bales of 180 kgs.)

	1960-61	1965-66	1966-67	1967-68	1968-69
(1)	(2)	(3)	(4)	(5)	(6)
Stocks brought forward	1.67	2.02	1.17	1.86	2.00
Home production ; jute	4.13	4.47	5.36	6.32	3.05
		(R)	(R)	(R)	

	(1)	(2)	(3)	(4)	(5)	(6)
Mesta		1.13	1.29	1.22	1.27	0.91
			(R)	(R)	(R)	(F)
Imports		0.42	1.21	1.65	Nil	0.60
Total		7.35	8.99	9.40	9.45	6.56
Home consumption		6.45	7.86	7.40	7.32	6.05
Exports		—	0.10	0.20	0.10	0.05
Stocks carried over*						
(Calculated)		0.90	1.03	1.80	2.03	0.46

(R) Partially revised.

(F) Final Estimates.

*Calculated carry-over stocks do not tally with the stocks brought forward next year.

Source: Monthly statistics of Jute and Gunny Statistics—by I. J. M. A. excepts data on production of the crop which are based on official estimates.

Feed, Seed and Wastage Rates

There is at present no information available on any scientific basis about the quantity of foodgrains being used for purposes of feed and seed and that being wasted. Some rough estimates were formulated long back by the Agricultural Marketing Adviser. Percentages of different foodgrains allocated to these different heads as calculated by the Marketing Adviser is given in Table 41. Applying these percentages to the annual gross production of different foodgrains over a number of years, a net figure of 12½ per cent was arrived at. For all official calculations, this is the formula being adopted to arrive at the figure of the net consumption of foodgrains.

None of these three items is in any way related to the gross production. Seed, for example, is related to the area under the crop. Wastage rates, if at all, are related with the condition and type of

storage available and the quantities of marketable surplus entering the market. Similarly feed rates have a direct relation with the programme of animal husbandry and poultry development. A set formula like the one in use at present is of little value for planning purposes. Suitable statistical information has to be developed in these respects.

TABLE 41
FEED SEED AND WASTAGE RATES IN INDIA
(Percentage of production)

<i>Commodity</i>	<i>Feed</i>	<i>Seed</i>	<i>Wastage</i>	<i>Total</i>
Rice (paddy)	2 ¹	6.4	1.1	6.7
Wheat	Negligible	82.7 ²	3.0	15.6
Barley	1.2	72.1 ²	2.0	22.7
Jowar	2.6	3.0	5.0	10.6
Bajra	4.1	2.7	5.0	11.8
Maize	1.0	3.3	5.0	9.3
Ragi	1.2	2.3	5.0	8.5
Small millets	2.1	2.3	2.5	6.9
Gram	12.0	49.1 ²	2.0	18.7
Other pulses	5.0	5.0	2.5	12.5
Potatoes	—	70.8 ²	17.0	—
Groundnut (in shell)	—	12.0	—	12.0
Sesamum	—	2.3	—	2.3
Fruits	—	—	25.0	25.0
Sugarcane (Gur)	3.0	6.6	—	10.5

1. Absolute figure in thousand tons.

2. lbs. per acre.

Source: *Agriculture in Brief*, third edition, 1957, p. 62, Directorate of Economics & Statistics, Ministry of Food and Agriculture.

PRODUCTION ECONOMICS

Cost of Production

With sustained efforts at planned development of agriculture involving introduction of improved technology, the need for data on cost of production of principal crops is being increasingly felt both for policy formulation and for organizing extension work. Adequate knowledge of the cost structure of principal crops is essential for working out schemes for providing adequate incentives to the farmers. To implement the policy of guaranteed minimum prices of agricultural commodities, it is necessary to have an idea of the cost of production of different crops.

A number of surveys as discussed below have been carried out in the different regions in the country to collect information on cost of production of various crops. These surveys and studies carried out at different times with diverse objectives by different agencies have not followed uniform concepts and do not provide information for all the major crops on a comparable basis. Most of them were not specifically designed to collect data on cost with a view to formulating price policy at the national and State levels.

The Punjab Board of Economic Inquiry had been collecting some statistics in a small way for the last 25-30 years. The work which had been interrupted by Partition has again been started.

The cost studies conducted under the auspices of the ICAR during 1933-34 to 1936-37 in the principal sugarcane and cotton growing tracts of India constituted perhaps the first systematic effort in the direction of studying the economics of crop production. The main objective of this survey was to collect data relating to cost of production of sugarcane in the country and to decide the area in which the sugar industry had the best chance of development. The survey also covered other principal crops grown in the selected regions and was spread over a period of three years.

During 1952-53, the ICAR, in collaboration with the then Indian Central Cotton Oilseeds Committee carried out a pilot study into the cost of production of cotton and its rotation crops in the district of Akola. The objective of the pilot study was to provide guidance on such methodological problems as the sampling design, sampling units and method of recording data.

The scope of the cost studies organized under the auspices of

the ICAR has been gradually widened. The Indian Central Sugarcane Committee of the ICAR sponsored studies on cost of production of sugarcane in four major sugarcane growing States, viz., U.P., Bihar, Andhra Pradesh and Punjab during 1955-56 to 1957-58, covering 23 districts in U.P., 7 in Bihar, 5 in Andhra Pradesh and 3 in Punjab. The studies were further extended to Maharashtra and Mysore in 1956-57 and 1960-61 respectively, covering 5 districts in each State. On the basis of the results of the Akola Pilot Study, the ICAR and the Cotton and Oilseed Committees jointly organized a study of the cost of cultivation of cotton and its rotation crops (jowar, wheat and groundnut) in the principal cotton tracts, viz., Punjab, Maharashtra, Gujarat and Mysore, covering the period 1960-61 to 1962-63. The study covered four districts in Punjab, six in Maharashtra, seven in Gujarat and three in Mysore.

A three-year study on the cost of production of jute and its competing crops, namely paddy, in West Bengal, Bihar and Assam, sponsored by the erstwhile Indian Central Jute Committee in 1963-64, was completed in 1970. The Indian Central Coconut Committee and the Indian Central Arecanut Committees have also been interested in working out the cost of production of their respective commodities and have financed surveys for the purpose in Kerala and Mysore.

Farm Management Studies

A comprehensive programme of Farm Management Studies was launched by the Directorate of Economics and Statistics, Ministry of Food and Agriculture, in collaboration with the Research Programme Committee of the Planning Commission in 1954-55. These studies were initiated in 1954-55 in five regions in the States of Punjab, U.P., Madras, West Bengal and Maharashtra and were extended in the following year to one more region in Maharashtra. The objective of the study was two-fold : to obtain guideline data for formulating agricultural policy and for extension work, and to determine the relative merits of the cost accounting and survey methods for collection of data on cost. The studies provided data on cost for major crops grown in the concerned regions, viz., paddy, maize, wheat, jowar, bajra, sugarcane, cotton, groundnut, etc., as well as on other aspects of the farm economy such as cropping pattern, the relative profitability of different crops grown on the farm, farm investment,

and return to the farm business, human and bullock labour employment etc.

The Studies were later extended by the Directorate of Economics and Statistics to more regions in the country, covering selected areas in Andhra Pradesh, Bihar and Orissa during 1957-58, Bihar during 1960-61, Punjab during 1961-62 and Madhya Pradesh, Mysore, Rajasthan and Kerala during 1962-63. Further studies have been initiated recently enlarging the coverage in U.P., Gujarat, Madras, Punjab, Maharashtra, Andhra Pradesh, Orissa and Assam. Of these recent studies, some are in the nature of repeat surveys. These recent studies, while retaining the objective of collecting farm management data on the pattern of the past studies, also aim at providing information on the economics of improved agricultural practices. An idea about the coverage of the scheme is given in Table 42.

TABLE 42
REGIONS COVERED UNDER FARM MANAGEMENT STUDIES

Sl. No.	Regions Covered		Crops Covered	Period of Survey
	State	Districts		
(1)	(2)	(3)	(4)	(5)
1	Punjab	Amritsar, Ferozepur	Wheat (Irrigated and un-irrigated), Wheat-gram, American Cotton and Desi Cotton	1954-55 1955-56 1956-57
2	Tamil Nadu	Salem, Coimbatore	Paddy, Jowar and Cotton	1954-55 1955-56 1956-57
3	Uttar Pradesh	Meerut, Muzaffarnagar	Wheat, Gram and Sugarcane	1954-55 1955-56 1956-57
4	West Bengal	Hooghly 24-Parganas	Paddy and Jute	1954-55 1955-56 1956-57
5	Maharashtra	Nasik, Ahmednagar	Wheat, Jowar and Bajra	1954-55 1955-56 1956-57
6	Maharashtra	Akola, Amraoti	Cotton, Jowar and Groundnut	1955-56 1956-57
7	Andhra Pradesh	West Godavari	Paddy and Tobacco	1957-58 1958-59 1959-60

(1)	(2)	(3)	(4)	(5)
8	Bihar	Monghyr	Paddy and Maize	1957-58 1958-59 1959-60
9	Bihar	Shahabad	Paddy, Maize and Chillies	1960-61 1961-62 1962-63
10	Orissa	Sambalpur	Aman Paddy	1957-58 1958-59 1959-60
11	Mysore	Bangalore	Paddy, Ragi and Potato	1959-60 1960-61 1961-62
12	Mysore	Mandya	Paddy and Sugarcane	1962-63 1963-64 1964-65
13	Haryana	Rohtak, Karnal & Jind	Wheat, Gram, Bajra and Jowar	1961-62 1962-63 1963-64
14	Kerala	Alleppey, Quilon	Paddy and Coconut	1962-63 1963-64 1964-65
15	Madhya Pradesh	Raipur	Paddy	1962-63 1963-64 1964-65
16	Rajasthan	Pali	Bajra, Jowar and Wheat	1962-63 1963-64 1964-65
17	Uttar Pradesh	Deoria	Rice, Sugarcane	1966-67 1967-68 1968-69
18	Uttar Pradesh	Muzaffarnagar (Repeat Survey)	Wheat, Sugarcane	1966-67 1967-68 1968-69
19	Gujarat	Surat	Paddy	1966-67 1967-68 1968-69
20	Tamil Nadu	Thanjavur	Paddy	1967-68 1968-69 1969-70 (in Progress)
21	Andhra Pradesh	Cuddapah	Paddy	1967-68 1968-69 1969-70 (In Progress)

(1)	(2)	(3)	(4)	(5)
22 Orissa	Cuttak	Paddy		1967-68 1968-69 1969-70 (In Progress)
23 Maharashtra	Ahmednagar (Repeat Survey)	Jowar, Wheat and Bajra		1967-68 1968-69 1969-70 (In Progress)
24 Punjab	Ferozepur (Repeat Survey)	Wheat, American Cotton and Desi Cotton		1967-68 1968-69 1969-70 (In Progress)
25 Assam	Nowgong	Paddy		1968-69 1969-70 (In Progress)

Source : Indian Agriculture in Brief, 1970.

The NSS Surveys

An inquiry on some aspects of cost of cultivation was undertaken by the NSS during their Fifth Round (December 1952 to March 1953) and information was collected on all the important crops for items such as seed, manure, water, human and animal labour. The inquiry was repeated in the two subsequent rounds, the Sixth and Seventh. The number of households covered in these rounds was 4,287, 4,388 and 3,144 respectively. The entire country, except Jammu and Kashmir and the Andaman and Nicobar Islands, was covered by the Survey. The results are published in Report Nos. 32-A to C. The First Report deals with four major crops, namely paddy, wheat, jowar and bajra. The second Report covers barley, maize, ragi, gram, small millets, cotton and jute, while the third one deals with minor cereals, pulses, sugarcane, oilseeds, potato, spices and tobacco. Estimates have been given for the total cost in terms of money by adding to the cash outlay the imputed value of material and labour inputs.

The National Sample Survey subsequently undertook another survey on some aspects of the cost of cultivation of important crops in their eleventh round of investigations (August 1956-February 1957) covering the same crops as in the earlier investigations. The survey covered the entire country except Andaman and Nicobar Islands, the North East Frontier Agency and the Naga Hills.

Studies Conducted by the State Governments and Local Bodies

Some of the State Governments and local organizations have also carried out surveys to collect data on cost. Information in respect of some of these surveys is given below :

- (i) The Government of Punjab conducted an inquiry into the cost of production of crops during 1951-52 to 1955-56 covering wheat, gram, cotton, maize, paddy and sugarcane crops.
- (ii) The Government of Assam conducted a Survey for the study of indebtedness among cultivators during the year 1963-64. Some data on cost of production of jute and paddy crops were also collected.
- (iii) In Bihar, a survey of 108 holdings in 6 villages was conducted during 1962-63 for studying the cost of cultivation of crops. This study covered paddy, wheat, maize, gram and potato crops.
- (iv) The West Bengal Government conducted a study on Farm Management and Cost of Production during 1962-63 and 1963-64. Data on the cost of cultivation of paddy, jute, sugarcane, potato, wheat, etc. were collected from 120 holdings.
- (v) The Government of Uttar Pradesh conducted a study of cost of production of peas, gram, wheat, sugarcane (gur), paddy and barley during 1964-65 on 320 holdings in the Ghazipur and Azamgarh districts.
- (vi) In Andhra Pradesh, a study of the cost of production of paddy, jowar, ragi, sugarcane and groundnut, was conducted during January, 1962 to December 1964, covering 540 holdings in three selected districts.
- (vii) In Madras, a survey of cost of production of rice was conducted in the Thanjavur and Coimbatore Districts during 1962-63 and 1963-64.

Reports are available only in respect of the studies undertaken in Punjab, Assam, West Bengal and Andhra Pradesh. No detailed information is, however, available on the design concepts and definitions adopted or the method of collection of data in respect of most of these studies.

Composite Demonstration Data

Some data on cost of production of "progressive" farmers are

available from the records of Composite Demonstrations organized in the districts covered under the Intensive Agricultural District Programme. The data give estimates for two categories, namely control costs and income and 'demonstration' costs and income, together with the yields in the two categories of plots. The costs relate to operational expenses only and do not include fixed costs. In West Godavari (Andhra Pradesh) and Thanjavur (Madras), the Farm Management Specialists, appointed under the IADP, have been maintaining, for some years, farm records of the various farmers in the district. The records contain data on the input-output structure for the farm as a whole. Data on the various "enterprises" are not separately recorded.

Farm Record Projects

With a view to obtain cost of production data under the improved levels of farm technology, the Agricultural Prices Commission in collaboration with the Directorate of Extension initiated a Farm Record Project in all the 15 IADP Districts during 1966-67. A Farm Record Book has been designed in consultation with the Directorate of Extension and the Farm Management Specialists of the IADP Districts. The Record Book provides for collection of such data as would enable the Commission to get an estimate of the average cost of important crops in each of the IADP Districts. Data are being collected only from the so-called 'progressive' farmers. A 'progressive' farmer has been defined as one for whom farm plans have been prepared and actually implemented for the past three years. Equal representation is being given to the small, medium and large farmers in the sample in each district.

Rural Credit Survey Report

The Reserve Bank of India conducted a Rural Credit Survey during November 1951 to August 1952, in 75 selected Districts spread all over the country. Being a 'Policy-oriented' survey, it was planned and conducted in a manner so as to provide some factual basis for proper formulation of recommendations relating to rural credit, rather than providing any State/national estimates of various economic characteristics. The data collected by the Survey, however, included farm expenses along with other items. In respect of expenditure data were collected on average cash and total expenditure on seed and manure, cash expenditure on fodder, 'other cash expenditure' and cash and kind expenditure on wages. In the absence of any

relatively firmer information of all-India validity, some use can be made of the results in this report.

Bench-Mark Survey Reports

The Programme Evaluation Organization of the Planning Commission has conducted a number of Bench-Mark Surveys in some of the selected blocks. Among other items information has also been collected on capital formation in agriculture. As these surveys are mostly local in character with centres hardly representing the country or even the State and with their primary objective other than the investigation of cost of cultivation, the data collected by them are also of very limited use.

Information on the cost of production of livestock products is all the more scanty. An enquiry into the cost of production of milk in Delhi, both in the city as well as in the villages was conducted for two years by the Indian Council of Agricultural Research. A similar study has now been completed in Madras and Calcutta. Another project regarding the comparison of the economics of mechanized and non-mechanized fishing craft in the Bombay area has also been recently completed by the Indian Council of Agricultural Research. Cost studies undertaken by different agencies are given in Appendix 17.

TRADE IN AGRICULTURAL COMMODITIES

Indian official trade statistics arise in the first place out of compilations made in the course of administration of customs laws such as those relating to taxation of goods entering and leaving the country and secondly from compilations made by departments of Government for their own use such as returns received from Railways on which are based statistics of inland trade. These statistics cover only a small section of the total field of exchange of goods moving along certain specified channels of trade.

Statistics regarding foreign trade in agricultural commodities, especially foodgrains, are almost complete and detailed break-up of the quantity and value is available in the publications of the Department of Commercial Intelligence and Statistics. All useful data about foodgrains are also published by the Directorate of Economics and Statistics in their Bulletin on Food Statistics : an annual publication.

Inland Trade

The position is, however, different with regard to inland trade. When a complete system of food control existed, movements of principal foodgrains were easy to obtain. With the lifting of the controls, the

situation has, however, changed and there is practically no information available regarding the trade taking place at various levels. An important gap in the inland trade statistics is the lack of information on the movement of agricultural commodities within the same State or principal trade blocks. For cotton the quantity of raw cotton imported (exported) by rail and river into (from) each internal block of the State or area from (to) each external block and other internal blocks of the State or area is given in 'Cotton Trade Statistics'. Trade blocks for each commodity or a group of commodities will be different and data in respect of trade between these will be quite valuable.

Data on inter-State Movement of foodgrains by rail and river are collected and published by the Director-General of Commercial Intelligence and Statistics. With the development of roads and road transport, the inter-State movement of foodgrains by road has assumed great importance. To obtain a complete picture of the extent of inter-State movement of foodgrains, the data on their movement by motor vehicles and other modes of transport, namely, carts, headloads, etc., also need to be collected. The Directorate of Economics and Statistics in the Ministry of Food and Agriculture, has organized a scheme to collect data on inter-State movement of foodgrains by motor vehicles. Upto February, 1967, the scheme was in operation in the States of Bihar, Maharashtra, Assam, West Bengal and Punjab (erstwhile). In view of the various restrictions imposed on the movement of foodgrains from time to time it was observed that it may not be possible to continue the scheme in all the States. Hence, with effect from 1st March, 1967, the scheme was discontinued in the States of Assam, Bihar, Maharashtra and West Bengal. At present, this scheme is in operation in the States of Haryana and Punjab. But data on road movement of foodgrains are not being published. Some information on inter-State movement of cereals by rail and river is given in Table 43.

Trade statistics that are now being compiled and published may be classified as follows :

1. Foreign Trade.
 - (a) Sea and air-borne trade with foreign countries.
 - (b) Trade across land frontiers.
2. Inland Trade.
 - (a) Rail and River-borne Trade.
 - (b) Coastal Trade.

TABLE 43
INTER-STATE MOVEMENT OF CEREALS BY RAIL AND
RIVER—QUANTITIES MOVED

(Million tonnes)

Commodity	1955-56	1960-61	1965-66	1966-67	1967-68
(1)	(2)	(3)	(4)	(5)	(6)
Rice (not in husk) , .	1.65	2.23	1.69	1.19	1.42
Rice (in the husk) . .	0.27 (0.18)	0.41 (0.27)	0.16 (0.11)	0.11 (0.08)	0.14 (0.09)
Wheat	0.82	3.06	4.60	6.12	7.35
Jowar	0.27	0.25	0.07	0.37	0.42
Bajra	0.15	0.17	0.06	0.03	0.11
Maize	0.12	0.24	0.19	0.39	0.50
TOTAL*	3.20	6.22	6.79†	6.25†	11.40†

Note.—Figures in brackets indicate rice equivalent of paddy (rice in the husk). These figures have been taken into account in arriving at the total movements.

*Inter-State movement of millets other than Jowar & Bajra is negligible.

†Includes 0.07, 1.07 and 1.60 million tonnes for other millets during 1965-66, 1966-67 and 1967-68 respectively.

The publications furnishing the respective information are as follows :

1. *Accounts Relating to the Foreign Trade and Navigation of India* —Monthly.
2. *Annual Statement of the Foreign, Sea-borne Trade of India.*
3. *Accounts Relating to Inland (Rail and River-Borne) Trade of India* —Monthly.
4. *Accounts Relating to the Coastal Trade and Navigation of India* —Monthly.

Recently, several important changes in the coverage, content, periodicity, trade classification, pattern of presentation of statistics, etc. have been introduced in these publications.

Important gaps in the inland trade statistics may be enumerated as follows :

1. Value of the commodity in movement is not shown.
2. Only 66 commodities are covered at present, and quite a large number of others are left out.
3. In the case of river-borne trade, the statistics cover only the trade carried by two steamer companies between three trade blocks.
4. The movements reported by the Railways relate to freight traffic only. The passenger parcel traffic is excluded.
5. Nothing is known about the trade carried by road—lorries or carts—and country craft.
6. As for the air-borne trade, although the trade is carried on by organized agencies, the required trade data are not published in any form excepting the total freight carried. The commodity-wise breakdown of the goods traffic are not being maintained by the Director General of Civil Aviation.

The whole question of improvements in the inland trade statistics was raised as far back as 1933 in the Report of the Committee on "Amplification of Inland Trade Statistics" under the • Chairmanship of Dr. John Mathai. But no improvement has so far been possible. The matter was again discussed at the Tenth Conference of Central and State Statisticians, in December, 1961. Various agencies concerned with the collection of such data have agreed to take necessary action in the matter.

During recent years, with the development of road transport, inter-State movement of agricultural commodities has assumed considerable importance. Efforts are, therefore, being made to organize the collection of data on inter-State movement of food-grains by motor vehicles.

National Income from Agriculture

THERE WERE no regular estimates of national income in India before 1948-49. Some of the estimates obtained by individual scholars and one by the Ministry of Commerce for the year 1945-46 are presented in Table 44.

It may be rather difficult to compare these different estimates, but one thing which comes out clearly from their study is that the share of agriculture in the national output of India has tended to decline over the last 70—75 years. The broad procedure adopted by the various workers in this field, for computing the value of agricultural output has been more or less the same. But difficulties faced by all of them have been the non-availability of sufficient data on output as well as prices of agricultural commodities. Estimates of national income and its components for the Indian Union are now being prepared by the National Income Unit of the Central Statistical Organization and published in 'Estimates of National Income.' The framework for the calculation of these income estimates was prepared by the National Income Committee set up in 1949. The Committee submitted its First Report in 1951 and the Final Report in 1954.

METHODOLOGY OF THE NATIONAL INCOME COMMITTEE

Methodology adopted by NIC

The method adopted by the National Income Committee to assess the contribution of agriculture to national income was governed

TABLE 44
ESTIMATES OF NATIONAL INCOME—INDIA

Sl. No.	Estimate by	Year	Total income in Rs. abja*	Per capita income Rs.	Contribution of Agri- culture in Rs. abja*	Per cent	Coverage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	Dadabhai Naoroji	1867-68	3.4	20	2.6	77	for most of British India.
2.	Baring Barbour	1882	5.3	27	3.5	67	for British India—all non-agri. income assumed to half of agricultural income.
3.	Curzon	1897-98	6.7	30	4.5	67	—do— for British India.
4.	W. Digby	1898-99	4.3	18	2.8	67	—do—
5.	F.J. Atkinson	1895	8.8	39.5	5.6	63	—do—
6.	Wadia & Joshi	1913-14	12.1	44	8.6	70	for the whole of India.
7.	Vakil & Muranjan	1910-14	17.7	58.5	11.1	64	for British India.
8.	Findlay Shirras	1921	26.0	107	17.1	66	for the whole of India.
9.	Shah & Khambatta	1921-22	23.6	74	21.0	89	for the whole of India.
10.	V.K.R.V. Rao	{ 1925-29 1931-32	{ 23.0 16.9	{ 78 62	{ 12.9 9.0	{ 57 53	for British India.
11.	R.C. Desai	1931-32	28.1	82.5	—	62	for the whole of India.
12.	Ministry of Commerce	1945-46	62.3	198	27.4	44	for British India.

* Abja = 100 crores = 10⁹.

Source: Tenth International Conference of Agricultural Economists (Mysore, India, 1958). J.P. Bhattacharjee (ed.), *Studies in Indian Agricultural Economics*.

more by the applicability of the data at that time than by conceptual considerations. Income from agriculture, animal husbandry, forestry, and fishery was estimated by the "value added" or "inventory" method. This means that estimates of gross output were first obtained and valued. Necessary deductions were then made from it to avoid double counting.

In the conventional series¹ (as recommended by NIC) the net product from 'agriculture' (proper) was estimated by the following four steps :

- (i) Obtain the gross value of output of each of the sixty-four agricultural commodities, mostly by evaluating the state outputs at the corresponding average wholesale prices during the respective harvest periods ;
- (ii) from the gross value of agricultural output, obtained in step (i), get the adjusted aggregate value of output, by subtracting the lower value of government procured foodgrains and for value added by rice milling industry (in factory establishments only) ;
- (iii) derive the net product of agriculture, by subtracting the sum of values of the following quantities from the adjusted value of output obtained in step (ii) above—(a) seed requirements, (b) market charges, (c) dung-manure, (d) compost purchased for manuring purposes, (e) bone meal, (f) chemical fertilizers, (g) operational costs of materials used in the processing of coffee and rubber, (h) repairs and depreciation of all implements, (i) irrigation charges, and (j) cost of feed of livestock required on farm ;
- (iv) finally add 2 per cent of net product to allow for non-reporting areas.

Regarding out-turn and value of the major and minor forest products, the National Income Committee assumed the out-turn of timber per square mile for the part for which data were not available to be 1/3rd of the out-turn per square mile of the area for which returns existed. It assumed the corresponding figure for fuel to be 2/3rds. It deflated the prices of major forest products available in a few selected urban areas by making allowance for transport and distribution charges. Thus the gross value of output in forestry was obtained by adding values of timber, fuel, minor products and other crops. An overall deduction of 5 per cent of gross value was made

1. Tables 45 and 46 provide the available data on National Income at current and constant (1960-61) prices.

TABLE 45
NET DOMESTIC PRODUCT BY INDUSTRY OF ORIGIN (at current prices)
(Rs. crores)¹

Industry	1960-61	1961-62	1962-63	1963-64	1964-65 ²	1965-66 ²	1966-67 ³
1. Agriculture	6,707	7,010	7,196	8,473	10,155	9,801	11,595
2. Forestry and logging	169	194	199	225	254	277	303
3. Fishing	78	87	86	95	108	124	153
Sub-total	6,954	7,291	7,481	8,793	10,517	10,202	12,051
4. Mining and quarrying	144	149	178	204	206	237	255
5. Large-scale manufacturing	1,070	1,177	1,300	1,519	1,700	1,855	2,061
6. Small-scale manufacturing	785	863	937	1,091	1,185	1,225	1,327
7. Construction	626	661	705	801	907	987	1,083
8. Electricity, gas and water supply	69	76	86	107	126	141	158
Sub-total	2,694	2,826	3,206	3,722	4,124	4,445	4,874
9. Transport and communication	583	655	736	807	875	971	1,061
(a) railways	252	280	312	352	366	395	398

Industry	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67
(b) communication	64	73	82	93	102	119	141
(c) transport by other means	267	302	342	362	417	457	512
10. Trade, storage, hotels and restaurants	1,301	1,387	1,492	1,700	2,069	2,232	2,650
Sub-total	1,884	2,042	2,228	2,507	2,944	3,203	3,701
11. Banking and insurance	158	183	224	249	289	344	398
12. Real estate and ownership of dwellings	384	403	443	511	552	593	625
13. Public administration and defence	547	602	680	799	915	1,065	1,199
14. Other services	904	966	1,025	1,098	1,231	1,376	1,541
Sub-total	1,993	2,154	2,372	2,657	2,987	3,378	3,763
15. Total : net domestic product	13,525	14,413	15,287	17,679	20,572	21,228	24,389

1. Crore=10 million.

2. Preliminary estimate.

3. Quick estimate.

for costs and depreciation, the remainder being the net value of output from forestry.

Income from animal husbandry was estimated as follows :

- (i) Derive the annual estimates of livestock from the quinquennial livestock census figures, by using the linear method of projection ;
- (ii) estimate the output of livestock products like milk and its products, meat, eggs, and multiply each of these quantities by their average wholesale prices and add on to get the total value of livestock product ;
- (iii) subtract the cost of feed of non-service animals and cost of materials and allowance for depreciation charged to current expenses from the total value of product obtained in step (ii) above and thus obtain the net value of livestock products ;
- (iv) add the net value of hunting to the net value of livestock products derived in step (iii) and thus obtain the total net value of output from the animal husbandry.

The total value of fisheries products was obtained by adding the value of total catch of fresh water fish and the value of total catch of sea-fish. The net value of output from fishery was then obtained by subtracting 5 percent of the total value of production as depreciation and cost of materials. Then the value got by fish curing and the value of fish caught by the persons other than fishermen, were added to the net value of output to obtain the net value of fishing. The income of gatherers of chanks, pearls, sea-shells, sea weeds etc. was also estimated and added to the net value of fishing, thus yielding the figure of contribution of fishery as a whole to national income.

REVISED METHODOLOGY (1961)

The CSO published, in May 1961, "National Income Statistics—Proposals for revised series of National Income Estimates for 1955-56 to 1959-60." This document was discussed in a conference on Research in National Income. The methodology adopted in the revised series is the same, i.e., inventory method. Various important revisions/improvements, in respect of the agriculture sector are explained below :

Agriculture

Latest available data on production of (i) major crops (based

on index numbers of agricultural production), (ii) minor crops, and (iii) unspecified crops, and (iv) their by-products, were incorporated. Out of the innumerable by-products, the following which are readily identifiable and have some definite economic value, have been considered—(a) stalks and straw (obtainable from important foodgrain crops except Arhar), (b) Arhar-sticks, (c) sesamum sticks, (d) cotton-seed, (e) cotton-sticks, (f) jute-sticks, (g) bagasse, (h) sugarcane-tufts, (i) rice-husk, (j) rice-bran, and (k) farmyard wood (both timber and fuel wood).

For evaluation of agricultural output, the NIC practice of using the average wholesale prices over the harvested periods have been continued for the 1961 revised series. Two improvements, however, have been rejected—(a) the empirical coverage of these prices has been considerably widened by collecting a mass of published and unpublished material, and (b) the data on harvesting periods, given in the Indian Crop Calendar, has been appropriately revised. Moreover, the method of averaging used by the NIC has also been changed, from arithmetic mean price to median price for valuation purposes, as given below :

- (a) Arithmetic averages of centre prices have been calculated to get a district mean, at each time point :
- (b) Median of such district prices, at each time point has been taken to represent the State price ;
- (c) Arithmetic average of these prices, at each time-point over the harvesting period, has been used for evaluating the State out-turn.

Thus, the estimates of gross value of out-turn have been obtained by evaluating the State out-turn for each commodity at the corresponding State average price—average of the wholesale prices prevailing over the harvest period of each crop.

Adjusted gross value of output. From the total gross value of output, necessary deductions have been made for (i) foodgrains procured at prices lower than the free market prices, and (ii) value added by organized rice-milling industry. No deductions have, however, been made for value added by hand-pounding of rice, which is considered an ancillary activity of the agriculturists.

To arrive at the net value of output from 'agriculture,' certain deductions have been made for current costs of cultivation, market

TABLE 46
NET DOMESTIC PRODUCT BY INDUSTRY OF ORIGIN (at 1960-61 prices)

Industry	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66 ²	1966-67 ³
1. Agriculture	6707	6856	6702	6827	7471	6402	6392
2. Forestry and logging	169	181	181	189	199	209	217
3. Fishing	78	80	76	83	91	93	94
Sub total	6354	7117	6959	7093	7761	6704	6703
4. Mining and quarrying	144	152	172	189	185	207	217
5. Large-scale manufacturing	1070	1178	1289	1414	1537	1575	1611
6. Small-scale manufacturing	785	848	881	958	1009	990	1004
7. Construction	626	636	665	735	756	748	757
8. Electricity, gas and water supply	69	80	90	109	120	135	151
Sub total	2694	2894	3097	3403	3607	3655	3740
9. Transport and communication	583	629	674	725	757	806	828
(a) railways	252	270	287	311	314	339	334
(b) communication	64	71	77	86	92	102	101
(c) transport by other means	267	288	310	328	351	365	393

(Rs. crores¹)

10. Trade, storage, hotels and restaurants	1301	1385	1456	1566	1679	1681	1723
	1884	2014	2130	2291	2436	2487	2551
	Sub-total						
11. Banking and insurance	158	179	192	206	211	222	230
12. Real estate and ownership of dwellings	384	395	408	422	434	446	455
13. Public administration and defence	547	596	673	777	852	974	1079
14. Other services	904	938	980	1018	1061	1105	1148
Sub-total							
	1993	2108	2253	2423	2558	2747	2912
15. Total net domestic product	13525	14133	14439	15216	16362	15593	15906

1. Crore=10 million.
2. Preliminary estimate.
3. Quick estimate.

charges and depreciation. The classificatory character of these items has been revised from that adopted by the NIC. These deductions have now been classified into (i) seed, (ii) manure (chemical fertilizers and organic manure), (iii) current repairs and maintenance of implements and various operational costs, (iv) irrigation charges (payable to government), (v) cost of feed of livestock required on farm, (vi) market charges, and (vii) depreciation of implements and other fixed assets (*e.g.*, farm buildings, wells, tanks etc.). Revised rates/estimates have been adopted in respect of these items.

Animal Husbandry

In the animal husbandry sector, the products have been classified into the following groups, *viz.*, (a) milk and its products, (b) meat, edible offals and other by-products, (c) hides and skins, (d) wool, hair and bristles, (e) eggs and poultry meat, (f) bones, horns, hoofs, etc., (g) dung (dung used for the purpose of fuel, manure and other domestic use), and (h) increment in stock. The manuring services of sheep, goats and other animals have been completely ignored. Revised yield rates, in respect of items (a)—(h) above have been adopted in computing the output of animal husbandry sector.

For estimating the state-wise average prices of various live-stock products, all information available in published or unpublished form was pooled together and averages worked out for each financial year. These averages were, then, suitably deflated on the basis of NSS data on retail prices for urban and rural areas.

The estimates of gross value of livestock products were worked out by evaluating the state-wise production at the corresponding average annual wholesale prices, as explained in (2) above. These values were, then, deflated suitably to allow for trade margins (between producers prices and wholesale prices) and for rural/urban price differentials.

Forestry

In estimating the contribution of the forestry sector, use has been made of the inventory method whereby the gross value of output is derived in the first instance and then the value of different inputs charged to current expenses is deducted. State-wise estimates of forest output suffered from two limitations—(a) non-reporting of major forest produce for forest under the ownership rights of non-Government agencies—corporate bodies, civil authorities and private individuals,

and (b) non-reporting of unauthorized removals of timber, firewood, etc. NIC had provided for certain adjustments, in respect of non-reporting of major forest produce under the assumption that the out-turn of timber per square mile was one-third of out-turn per square mile of the area for which returns exist ; the corresponding figure for fuel was assumed to be two-thirds. The assumption involved in this procedure is that the forest areas managed by non-Government agencies are less exploited. But in consequence of the National Forest Policy, announced in May 1952 (whereby sizeable portions of private owned forests were acquired by state governments), the procedure of adjustments adopted by NIC cannot be fully applicable.

The coverage of unrecorded production of timber and fuel-wood is mainly spread over (i) unauthorized removals from regularly worked forests and production not recorded in Indian Forest statistics but pertaining to private-owned forests, and (ii) production from trees outside forests, *e.g.*, trees in village commons, field ridges, canal banks, roadside avenues, individual household courtyards and unproductive fruit trees. On the basis of some indirect evidence, it has been assumed (in the 1961 revisions) that two-thirds of the unrecorded timber originates from regularly worked forest areas corresponding to category (i) above, whereas the rest is assumed to represent fellings etc. rejected in 'agriculture' proper. The break-up for fuel-wood, by two categories (i) and (ii) above has been estimated on the basis of Timber Trends Studies. For evaluation of output in the forestry sector, use was made of the CMI¹ input prices of timber and fuel-wood, for the conventional series. The present (revised) series, on the other hand, have been built up by using the state annual wholesale prices of fair average qualities of commercial timber. The average wholesale prices of various varieties of timber and fuel-wood, moreover, have been deflated at a flat rate of 25 per cent to allow for the trade and transport margins, implicit in them. The average prices thus worked out are the nearest approximation to the producers' prices. There has been no revision in respect of "netting" for various cost deductions related to output in the forestry sector. As such, the NIC figure of 5 per cent for various cost deductions has been retained in order to arrive at the net output.

Fishery

In preparing the estimates of income from the 'fishery' sector, use has been made of the value added approach. Differences in the

1. Census of Manufacturing Industries.

conventional series and revised series (1961) are explained below :

(a) *Commercial fishing.* The estimates of production of inland fish have undergone downward revision as a result of (i) availability of latest data on marketable surplus of inland fish from the Directorate of Marketing and Inspection, and (ii) the downward revision of estimated retention of inland fish by professional fishermen, because of applying the relevant percentage ratios to quantity figures rather than the value figures of marketable surplus of inland fish.

The practice previously followed was to project the base year all-India prices, implicit in the quantity and value figures given in the Report on Marketing of Fish and used by NIC, by Economic Adviser's wholesale price index of fish. Due to availability of large mass of data on prices from published and unpublished sources, it has become possible to widen the empirical coverage of prices considerably.

(b) *Subsistence fishing.* Hitherto the value of subsistence fishing, for each year, was assumed to form 25 per cent of the net value from commercial fishing, which involved the assumption that the movement of the former was parallel to the year-to-year movement of production of marine fish. For the revised series, the estimates have been obtained by projecting the base year figures implicit in the NIC estimates, by relating it with the movement of marketable surplus of inland fish, which has been re-assessed by the Directorate of Marketing and Inspection (DMI).

(c) *Value added by curing.* The change in the conventional estimates results mainly from (i) the revision of rates of utilization of fish for salt-curing and sun-drying, supplied recently by the Directorate of Marketing and Inspection, and (ii) the upward revision of prices.

(d) *Net income from pearl-gathering etc.* The estimates have undergone downward revision in the light of availability of independent estimates of "gross income per (maritime) fisherman" (by the Central Marine Fisheries Research Station, Mandapam). Other available evidence also shows that the figures used in the conventional series were considerably higher. (The conventional figure was estimated by dividing the total net income from commercial fishing by the estimated gainful employment therein). The latter, being based on extrapolation of 1941-51 census data, contains an unknown margin of error.

REVISED SERIES

In the light of the comments and suggestions, 'on the CSO publication "National Income Statistics—Proposals for a revised Series of National Income Estimates for 1955-56 to 1959-60" and subsequent studies in the National Income Division of CSO, another publication entitled "Brochure on Revised Series of National Product for 1960-61 to 1964-65" was published in August 1967. Various important revisions/improvements, in respect of agricultural sector are explained below :

Agriculture proper. In all 68 agricultural commodities including various by-products have been considered for evaluation. These can be divided into four broad categories, viz., (i) 30 principal crops for which periodic estimates of area and out-turn are issued by the Directorate of Economics and Statistics, Ministry of Food and Agriculture (DESAg) ; (ii) 15 minor crops out of which *ad hoc* estimates of area and out-turn for 12 crops are released annually by the DESAg and for the remaining three crops, viz., citrus fruits, grapes and mangoes, yield rates have been taken from the relevant marketing reports while the area figures have been obtained from the DESAg ; (iii) 11 miscellaneous unspecified crop groups which have not been included in any of the two categories described above, and for which data are available with the DESAg ; and (iv) 12 other products and by-products.

Estimates of production of crops under category (i) are mostly based on the results of the random sample crop cutting surveys conducted by the respective State Government agencies. These are regularly collected and published by the DESAg in their publication entitled 'Area and Production of Principal Crops in India.' The estimates of physical production of crops under category (ii) are, however, very rough in character as they are not based on any objective survey on yield rates. In the case of crop groups covered under category (iii) out-turn figures are available and, therefore, their evaluation is done by applying appropriate average value of yield per hectare to the corresponding area figures for each crop group separately. Estimates of out-turn for items under category (iv) have been framed by using statistical source material of varying quality and coverage.

Data on wholesale prices were mostly obtained from the published and unpublished records of the DESAg and in such cases

where the same were found deficient, additional data were obtained directly from the State Statistical Bureaus. A straight mean of the prices prevailing in the various centres within a district over the peak marketing period was taken to represent the district average and the latter, weighted in proportion to the district production of a crop, yielded the State average price of a commodity. These prices have been used to evaluate the out-turn figures for each commodity. Further, an adjustment of 0.35 per cent to the value of out-put, based on detailed analysis for each State and each principal crop, has been made to allow for under-reporting of area in the regular crop forecasts.

From the total value of gross out-put as estimated above, necessary deductions were made for (a) foodgrains procured by the Government at prices lower than the market prices, and (b) value added by rice milling industry. Yearly data relating to quantities of different foodgrains procured by the government and the corresponding procurement prices are published regularly by the DESAg in their publication 'Bulletin on Food Statistics.' Estimates of value added by rice milling industry have been made on the basis of material contained in 'Price Spread of Rice Studies in Costs and Margins, 1959-60' (issued by the DMI) and the 'Report of Rice Milling Committee, 1955' in respect of State-wise estimates of various components of milling charges per unit of paddy milled and the proportion of paddy milled by rice milling industry respectively.

Livestock. The value of output has been estimated for each of the 35 livestock products which have been classified into 8 groups, viz., (i) milk and milk products, (ii) meat and meat products, (iii) hides and skins, (iv) eggs and poultry meat, (v) wool and hair, (vi) dung, (vii) increment in livestock and poultry, and (viii) other products. Information on quantity of output of various livestock products is not available on an annual basis. Marketing Reports on several commodities, published by the DMI do, however, furnish rough estimates of production. In addition, the Institute of Agricultural Research Statistics has recently collected very useful data on average yield rates of bovine milk, eggs, dung and wool for a few States. In the absence of any other reliable information on the quantity estimates of various livestock products, use has mainly been made of the yield rates made available by these agencies. The State-wise quantity estimates of individual livestock products in a particular year have been prepared on the basis of the corresponding average yield rates and the total number of animals based on interpolation/extrapolation of the quin-

quennial livestock censuses 1951, 1956 and 1961 by fitting a second degree curve. The estimates of value of the output have been worked out by evaluating the State production at the corresponding average annual wholesale prices duly deflated for trade margins between producers' price and wholesaler's price and for rural/urban differentials where the price data related exclusively to the urban areas. The rates of growth in livestock population observed during 1951-61 and projected beyond the year 1961-62 for use in the current estimates is not being substantiated by the available data for a number of States based on 1966 livestock census. As such there is every likelihood of a substantial downward revision in the percentage increase in the number of livestock as well as value of livestock products. These revisions would be effected as soon as fuller data become available.

Hunting and Trapping. The gross value of output of this activity has been estimated on the basis of partial data available in respect of (i) number of animals killed or caught by important species, and (ii) approximate prices of different kinds of furs obtained from the Ministry of Food and Agriculture, Community Development and Co-operation and the Indian Forest Research Institute, Dehradun respectively. As the data suffer from under/non-reporting, necessary adjustments were made for the same on the basis of the number of hunters reported in 1961 population census for the relevant areas.

For arriving at the estimates of net product from 'agriculture' (proper) and 'livestock production,' deductions have been made for various items of inputs. These consist of (i) seed, (ii) manure (chemical fertilizers and organic manure), (iii) current repairs and maintenance of fixed assets and other operational costs, (iv) feed of livestock, (v) irrigation charges, (vi) market charges, (vii) electricity, (viii) pesticides and insecticides, (ix) diesel oil, and (x) allowance for depreciation. For most of the principal crops and some minor crops, data on quantity of seed required per acre sown have been taken from the relevant marketing reports brought out by the DMI. These were further supplemented by data published in the National Sample Survey (NSS) Report No. 32 entitled 'Some Aspects of cost of cultivation.' As regards inorganic manure, State-wise data on actual off-take in physical terms and the pool release prices were obtained from the Ministry of Food and Agriculture. The estimates of value of organic manure were also prepared on the basis of the data contained in the

NSS Report No. 32. The estimates of cost of repairs and maintenance in rural areas of agricultural implements and machinery, bullock carts, farm structures and other works such as wells, bunds etc. were prepared on the basis of the results of 'All-India Rural Debt and Investment Survey, 1961-62.' Similar costs in the urban areas were estimated on the basis of information contained in Indian Livestock Census.

The estimates on repairs and maintenance of meat stalls and current expenditure production of ghee, hide and skins, wool, etc. were prepared on the basis of the data contained in the DMI reports on the marketing of livestock products. The cost of feed of livestock has been estimated on the basis of total availability of feed comprising (a) roughages, (b) foodgrains, (c) concentrates, and (d) salt, medicine, etc. The entire value of fodder crop, cane trash, rice bran, grass and 95 per cent of the value of stalks and straw have been assumed to constitute livestock feed in the form of roughages. The quantities of different foodgrains and oilcakes fed to animals with the exception of gram and cotton seed, have been estimated by adopting relevant proportions given in the *Population and Food Planning in India, 1947* by Baljit Singh and the Marking Report (MR) on oil seeds respectively.

In the case of gram this proportion has been estimated on the basis of NSS Report No. 65 and for cotton seed on the basis of its utilization rates. The expenditure on salt, medicines and other miscellaneous feed has been estimated at Rs. 1.62 per cattle equivalent for 1955-56 on the basis of data given in the NSS Report No. 65 which has been adjusted to later years on the basis of Economic Adviser's (EA's) index numbers of wholesale prices of salt. The cost of the portion of livestock feed consumed in agriculture and by non-service animals has been estimated by using the 1961 livestock census information on classification of cattle, buffaloes, etc.

The information on charges for water supplied to the farmers by the government irrigation systems have been culled out from the budget documents of the Central and the State Governments. The estimates of total market charges in respect of 'agriculture' (proper) have been prepared by adopting relevant ratios of market charges to total value of farm output as given in the Rural Credit Survey Report relating to the year 1951-52, while in the case of livestock sub-group, these have been worked out on the basis of relevant proportions culled out from various MRs issued by the DMI. Expenditure on electricity consumed was estimated on the basis of data

relating to sale proceeds of electricity utilized for agricultural purposes, obtained from the office of the Central Water and Power Commission (CWPC).

Expenditure on pesticides and insecticides for the year 1961-62 to 1964-65 was estimated on the basis of data on average value of these products used per hectare and the total area covered under the scheme, as obtained from the Ministry of Food, Agriculture, Community Development & Co-operation. The value of diesel oil has been worked out on the basis of estimated number of tractors and diesel engines in each year and the respective rates of consumption per unit.

The estimates of allowance for depreciation for farm structures like farm houses, grain golas and cattle sheds, agricultural implements and machinery, bullock carts and other fixed assets are prepared on the basis of the value of these assets obtained from the 'All-India Rural Debt and Investment Survey 1961-62,' on the assumption that the average life for farm buildings is 40 years, for bullock carts 10 years and for the agricultural implement and machinery 8 years. In respect of hunting and trapping, however, an arbitrary allowance of 3 per cent and 12 per cent and of their gross value of output has been made for various operational costs and allowance for depreciation respectively.

Forestry and Logging. In the revised series, the gross product in forestry and logging has also been measured by following the value added approach. The major forest products are (i) industrial wood (timber, round wood and match and pulpwood), and (ii) fuel-wood (fire wood and charcoal wood), while the minor forest products consist of a large number of heterogeneous items such as bamboos, sandalwood, charcoal, lac, etc. For major products, data on quantities exploited are available on an annual basis from the Indian Forest Statistics (IFSt) issued by the DESAg. Data on wholesale prices at assembling centres inclusive of trade and transport margins are directly obtained from State Chief Conservators of Forests and they are, therefore, adjusted downward to make them approximate to producer's prices. Information on the minor products, however, is generally given in value terms only and represents the royalty amounts of the contract fee realized by the government rather than the economic value of these products. The reported value figures are, therefore, adjusted to arrive at their economic value.

The available evidence shows that considerable quantities of industrial and fuel-wood escape reporting for purposes of the IFSt. A rough estimate of the extent of under-reporting/illegal removals of

major forest products for the year 1957-58 is given in the publication 'Timber Trends and Prospects in India.' Accordingly an allowance of 10 per cent of the value of recorded production has been made to cover all such unrecorded production for major forest products except in Assam. The total estimated value of unrecorded production of major forest products as estimated above, roughly works out at four times of the value reported in the IFSt. For minor products also the same ratio has been adopted to reported figures to arrive at their economic value except in Rajasthan and Uttar Pradesh. These adjustments for other years have been assumed to be the same as for the year 1957-58. An adjustment has also been made to account for new plantations on the basis of data relating to the expenditure on such plantations contained in the budget documents of the State Governments and Union Territories.

In order to arrive at the estimates of net product from forestry, deductions have been made for (i) expenditure on repairs, maintenance of roads and other assets and other operational costs, and (ii) allowance for depreciation of fixed assets. On the basis of information on purchase of commodities and services etc. for government forests culled out from the budget documents of State Governments and Union Territories, (i) the value of repairs, maintenance and operational

TABLE 47
NET PRODUCT FROM FORESTRY AND LOGGING
(at current prices)

Item	(Rs. lakhs)				
	1960-61	1961-62	1962-63	1963-64	1964-65
1. Industrial wood	10076	11343	11361	13429	15913
2. Fuel-wood	3106	3482	4015	3990	4288
3. Minor forest products	4414	5340	5266	5937	6112
4. New plantations	265	283	380	408	511
5. Gross value of output	17861	20448	21022	23764	26824
6. Less repairs, maintenance and other operational costs	770	877	921	1036	1180
7. Gross product	17091	19571	20101	22728	25644
8. Less allowance for depreciation	176	202	206	234	263
9. Net product	16915	19369	19895	22494	25381

costs, and (ii) allowance for depreciation have been taken to be 4 per cent and 1 per cent of gross output respectively. Further it has been assumed arbitrarily that 75 per cent of the outlay on new plantations is on wages and salaries and the remaining 28 per cent is on cost of materials. Estimates of gross product, allowance for depreciation and net product at current prices for the years 1960-61 to 1964-65 have been presented in Table 47, whereas the details for the year 1960-61 have been given in Table 48.

TABLE 48
NET PRODUCT FROM FORESTRY AND LOGGING : 1960-61

<i>Items</i>	<i>Quantity (000' cu. met.)</i>	<i>Price (Rs. per cu. met.)</i>	<i>Value (Rs. lakhs)</i>
1. Industrial wood	6044		10076
(a) recorded	5430	167.27	9083
(b) unrecorded	614		993
2. Fuel-wood	12693		3108
(a) recorded	11435	24.54	2806
(b) unrecorded	1258		300
3. Minor forest products			4414
(a) recorded			1252
(b) unrecorded			3162
4. New plantations			265
5. Gross value of output			17861
6. Less repairs, main- tenance and other op- erational costs			770
7. Gross product			17091
8. Less allowance for de- preciation			176
9. Net product			16915

The estimates of gross product at constant prices in forestry and logging have been obtained by revaluing each of the major forest products at 1960-61 prices. In the case of minor forest products the value of output at current prices has been deflated with the help of the specially prepared indices of wholesale prices of major forest products.

The estimates of gross products and net product at constant prices are presented in Table 49.

TABLE 49
NET PRODUCT FROM FORESTRY AND LOGGING
(at 1960-61 prices)

(Rs. lakhs)

Item	1960-61	1961-62	1962-63	1963-64	1964-65
1. Industrial wood	10076	10719	10429	11247	12362
2. Fuel-wood	3106	3146	3582	3377	3502
3. Minor forest products	4414	4946	4769	4969	4790
4. New plantations	265	256	337	340	371
5. Gross value of output	17861	19067	19117	19933	21025
6. Less repairs, maintenance and other operational costs	770	816	835	869	919
7. Gross product	17091	18251	18282	19064	20106
8. Less allowance for depreciation	176	188	188	196	207
9. Net product	16915	18063	18094	18868	19899

Table 50 presents the revised and conventional estimates for the year 1960-61. The differences in the two estimates are mainly due to the differences in the out-turn figures and prices of major and minor products. As regards out-turn, no allowance was made in the conventional estimates for unrecorded production of forest products, whereas the same has now been taken to be 10 per cent of the recorded production in the case of industrial wood and firewood and 300 per cent of reported value in the case of minor products. The net product from new plantations which was not taken into account in the conventional estimates has now been included in the revised estimates. There has also been an upward revision in the prices of major forest products resulting mainly from the availability of large mass of data obtained from the State Chief Conservators of Forests.

TABLE 50
REVISED AND CONVENTIONAL ESTIMATES OF NET PRODUCT
FROM FORESTRY AND LOGGING: 1960-61

(Rs. lakhs)

<i>Item</i>	<i>Revised</i>	<i>Conventional</i>
1. Industrial wood		
(a) quantity ('000' cu. met)	6044	5580
(b) value	10076	8198
2. Fuel-wood		
(a) quantity ('000' cu. met.)	12893	12313
(b) value	3106	2531
3. Value of minor forest products	4414	1134
4. New plantations	265	—
5. Gross value of output	17861	11863
6. Less repairs, maintenance, other operational costs and depreciation	946	593
7. Net product	16915	11270

Fishing. The revised estimates have been prepared at the State level by adopting the value added approach. The figures of catch of marine fish and commercial inland water fish, as supplied by the CMFRI¹ and the State Fishery Department (SFD) have been adopted for preparing the revised estimates. The quantity of subsistence fish caught by non-professional fishermen has been estimated on the basis of State-wise proportions of subsistence to commercial catch of inland water fish. These percentages were made available by the SSBs² in consultation with the respective SFDs. The evaluation of catch of fish has been done at State level separately for marine fish and inland water fish at average prices accruing to producers as supplied by the SFDs. The estimates of value added by salting and sun-drying have been prepared on the basis of relevant data also supplied by the SFDs. The estimates of net product from collection of pearls, chanks, oysters and sea weeds etc. have been prepared on the basis of estimated working force, obtaining by interpolation and extrapolation of the figures for 1951 and 1961 popu-

1. Central Marine Fisheries Research Institute.

2. State Statistical Bureau.

lation censuses and the average annual earnings per worker engaged in these activities in Kerala. However, the average annual earnings per worker in the non-maritime States was arbitrarily taken as one-third of the average annual earnings of a worker in Kerala, excepting Madras, for which the estimates were based on the reported value of pearls and chanks.

To derive the net product from the fishing industry, deductions were made for (i) repairs, maintenance of boats, nets, etc. and other operational costs, and (ii) allowance for depreciation of fixed assets. It was assumed on the basis of information collected from SFDs that in the case of marine fish, (i) the allowance for depreciation, and (ii) repairs, maintenance and other operational costs each formed 10 per cent of the gross value of output. For inland water fish, however, it was assumed that allowance for depreciation and repairs, maintenance and other operational costs together formed only 10 per cent of the value of gross output, with allowance for depreciation alone accounting for 4 per cent.

TABLE 51
NET PRODUCT FROM FISHING (at current prices)
(Rs. lakhs)

Item	1960-61	1961-62	1962-63	1963-64	1964-65
1. Inland fish	5351	6131	6369	6717	7440
2. Marine fish	2853	3040	2664	3299	3990
3. Subsistence fishing	344	386	443	463	539
4. Fish curing	274	262	252	311	336
5. Gross value of output	8822	9819	9728	10790	12305
6. Less repairs, maintenance and other operational costs	617	677	656	739	855
7. Gross product	8205	9142	9072	10051	11450
8. Less allowance for depreciation	498	547	519	598	695
9. Net product (item 7-8)	7707	8595	8553	9453	10755
10. Add net product from gathering of pearls, chanks and other sea products	58	67	61	67	73
11. Total net product	7765	8662	8614	9520	10828

TABLE 52
REVISED AND CONVENTIONAL ESTIMATES OF NET PRODUCT
FROM FISHING : 1960-61

(Rs. lakhs)

<i>Item</i>	<i>Revised</i>	<i>Conventional</i>
1. Inland fish		
(a) production (00 tonnes)	4536	6189
(b) price (Rs. per tonne)	1106.46	816.93
(c) value of output	5351	5056
2. Marine fish		
(a) production (00 tonnes)	9592	9033
(b) price (Rs. per tonne)	297.44	274.33
(c) value of output	2853	2473
3. Subsistence fishing	344	1789
4. Fish curing	274	501
5. Gross product	8822	9824
6. Less repairs, maintenance and other operational costs and allowance for depreciation	1115	376
7. Add net product from gathering of pearls, chanks and other sea products	58	158
8. Total net product	7765	9606

CRITICAL ANALYSIS

Statistics of output of agricultural commodities are not completely accurate in any country in the world, as by the very nature of the industry, it is not possible to have a census of production comparable to that of manufactures. In India, however, the difficulties are especially great. The number of production units runs into many millions (nearly 60 million), most of them do not keep any accounts, a large portion of the output is not sold for cash, being either consumed by the producer and his family or exchanged in barter. Prices at which the same or similar output is sold varies widely depending upon the point of sale, the time of sale, and the region in which the output is marketed. Differences in quality do not find statistical expression in output and there are practically no statistics of inventories except for one or two crops like cotton and

jute for which trade inventories are available. There are many minor crops for which there are no estimates even of output.

Under the circumstances, estimates of both production and value have to be obtained by outside or third party assessment and not directly from those who produce and sell their output as is done in the case of manufactures in the organized sector. All this naturally leads to a considerable measure of unreliability in our basic statistics of agricultural output. It is true that in recent years, we have substituted scientific crop-cutting on a random basis for getting estimates of the output of our major cereals but even this has not given enough confidence in the reliability of the estimates in view of the fact that estimates of output obtained on the NSS data give widely divergent figures. Under the circumstances, we would suggest that a high priority should be given in our national income work to the compilation of more reliable estimates of agricultural output. As this can be done only with the help of and by the Government agencies, we would offer the following suggestions :

1. Bench-mark census by enumeration of all cultivated land in the country with full details of land utilization—the survey to be repeated at decennial intervals with annual sample surveys to act as a check on the statistics of classified cultivated area compiled by the revenue agency.
2. Extension of estimation of output by crop-cutting on random basis to all the agricultural crops, including non-cereals, and minor crops.
3. A more comprehensive and territorially well distributed system of price reporting, with built in machinery for verification by sample checking and periodic evaluation of accuracy.
4. Bench-mark surveys on a sample basis of completed villages—data being compiled household-wise of simple social accounts of production, consumption, balance sheet and rest of the world. If this can be done at periodic intervals and supplemented by annual sample surveys of rural households on NSS lines, it would enable us not only to obtain reasonably accurate data on output, input, consumption, savings and investment in the rural economy but also throw a flood of light on many other structural details and enable us at the same time to obtain data on changing trends in the agrarian-cum-rural structure.

In addition to agricultural production proper, we have production of milk, poultry, eggs, honey and other items allied to agriculture. It is hoped that enough data for estimation purposes will become available on these items in the bench-mark surveys of complete villages suggested earlier.

As regards fishery, it is obviously difficult to get any census of output in view of the nature of the industry and the number of persons involved. It is also difficult to use the method of random sample weighings of catches (corresponding to random crop cuttings in agriculture) because of the non-concentration of output at a fixed point of time or within a relatively short period. It may, however, be possible to have bench-mark surveys of fishery villages and then follow it up by sample surveys of fishing household on NSS lines ; this may enable an estimation to be made on the basis of data collected on number of persons engaged in fishing, average days of work, average output by kind, and prices. It could then perhaps be supplemented by random sample estimation of actual output. Anyway, it is believed that more thinking is required on the subject of the estimation of the output and the compiling of social accounts of fishery households than has been given to it so far. Gaps in basic agricultural statistics needed for estimation of national income and related matters are shown in Appendix 18.

Improvements Recommended

Improvements Introduced Since Independence

CONCERTED EFFORTS have been made during the last 23 years after Independence to improve the quality and quantity of agricultural statistics. They may be enumerated as follows :

1. Coverage of the unsurveyed areas has been extended by cadastral surveys.
2. Coverage of land utilization statistics has increased from 284 million hectares in 1950-51 to about 306 million hectares during 1964-65. Agricultural statistics are now available for about 94 per cent of the total geographical area of the country ; 77 per cent area covered by complete enumeration, 5 per cent by sample surveys and another 12 per cent by conventional estimates. The non-reporting area has now come down to 6 per cent. There is, however, very little cultivation in most of the non-reporting areas which are mainly covered by hills, forests and deserts. Efforts are being continued to complete the coverage of land utilization statistics by bringing the non-reporting areas to the reporting fold.
3. The number of crops for which forecasts are now issued has increased to 34 from only 10 before 1945.
4. Reporting areas have been extended by the establishment of a suitable reporting agency where no such agency existed earlier.

Patwari agency wherever it existed has been reinforced so as to bring about reduction in the jurisdiction of the primary and supervisory officers to increase the reliability of the data collected by them. Other reporting agencies have been established in the other non-reporting areas wherever possible.

5. A system of rationalized supervision of the work of area enumeration of *Patwari's* involving checking of figures by superior officers in randomly selected villages has been introduced. *Patwari's* inspection of the area under his charge has been rationalized using the method of sampling in a way so as to provide objective and reliable estimates of area under crops for the pre-harvested forecasts.
6. Co-ordination of agricultural statistics all over the States has been brought about by introducing uniform and agreed concepts and definitions of land utilization, crop areas and other topics related therewith.
7. Improved formulae have been evolved to define 'standard yield' for purposes of pre-harvest estimates.
8. Random sampling crop-cutting surveys are now conducted on a nation-wide scale and the results are utilized in the estimation of crop yields.
9. Surveys for the evolution of techniques for estimation of area and production of minor crops of commercial importance and protective foods like fruits and vegetables have been conducted in different areas.
10. The available information is now being processed. Index numbers of agricultural production and harvest prices are being regularly formulated. Efforts are also being made to construct production indices for the different States and area index for the country as a whole. A few States have also started compilation of the index numbers of parity between prices received and prices paid by the farmers.
11. Coverage in respect of forest statistics has been extended to all the States. The scope of these statistics has also been enlarged so as to include data on the economic aspects of forest activity, such as labour, employment, out-turn of timber species-wise, fuel and forest produce.
12. A clear cut definition and a systematic procedure has been evolved for the collection of farm prices all over the country.

With regard to open market and controlled prices, the number of quotations has been increased and the number of reporting centres enlarged.

13. The Tenth Quinquennial Livestock Census has been conducted in 1966 on an improved basis. Information on a number of additional items has been collected during this census as compared to earlier censuses. Besides the normal administrative supervision, the departmental staff carried out rationalized supervision in 5 per cent of the rural and urban areas selected randomly during the enumeration period. The results of the rationalized supervision are expected to throw light on the extent of under or over-estimation in the census figures. During the 1966 Livestock census, in addition to Rationalized Supervision, a sample survey entitled 'Post Enumeration Sample Survey' was also carried out. The object of the survey was to collect data on additional items like age-composition, breed, immunization against rinderpest, etc. During the census enumeration a provision was also been made to collect data on fishing crafts and tackles.
14. Efforts have been made to ensure an adequate training of the primary reporting agencies in all the new concepts and definitions evolved as a result of the various improvements in the collection of agricultural statistics.
15. Culturable wastelands have been surveyed and the Reports for seven major States concerned have been published.
16. There are a number of agencies responsible for the collection of agricultural data. The duplication of work as between the Directorate of Economics and Statistics, Ministry of Food and Agriculture and the various Commodity Development Departments has been eliminated. While the collection of area and production figures is now the responsibility of the Directorate, the collection of other statistics incidental to the study of the utilization of the crop has been entrusted to the Departments. Similar co-ordination has been brought about with regard to the collection of data on prices between the various agencies which have been engaged in this work.

Existing Gaps and Recommendations for the Future

The perfection of techniques for collection, processing and analysis of agricultural statistics is a continuing task in India as anywhere else. In spite of the improvements introduced after Independence, in coverage, machinery and methodology, India has still a long way to go.

The Primary Reporting Agency

One of the most important factors contributing to the defective nature of agricultural statistics, is the extent of burden imposed on the primary reporting agency, the *Patwari*. Efforts made in the direction of reducing his jurisdiction, have not succeeded so far. There are examples of States like Bihar where the jurisdiction of the *Karamchari* has been reduced from 20—30 villages to about 10 villages on an average. There is yet the need to take some persistent action in the matter so as to improve his efficiency.

Besides reducing his jurisdiction, persons employed for the job should have the necessary qualifications and be made to understand that the collection and presentation of agricultural statistics is one of their essential duties. Till today, they consider it as nothing more than an additional burden without any compensation. Till recently, there were examples of States like those of Mysore where the post of *Patwari* was hereditary. Such practices were naturally a bar on efficiency.

The main drawbacks of the existing system of crop estimation are : (1) There is no Central supervision over the area enumeration work done by the State Governments ; (2) Although there is Central supervision over the yield estimation done by State Governments, the quantum of such Central supervision is not adequate ; (3) Firm estimates of production of various crops become due only after the main crop is harvested. These actually become available with considerable time-lag after the due dates ; and (4) The present system does not provide for making available advance estimates of production for the requirements of policy and administration.

Under the Ordinance of the Department of Agriculture, 1903, the Village Associations in Japan, are required to supply all the necessary statistics to the Government. All possible data with regard to area

and production of crops, single and double cropped areas, areas tilled by cattle or manual labour and owned or leased by each farmer, the number of cultivating cattle, households and persons, exclusively and secondarily engaged in cultivation and those of persons agriculturally educated, are required to be supplied by these Associations. We have in India, their counterparts in Village *Panchayats*. Efforts should be made to train the *Panchayat* people also to take interest in the work of the *Pahwari* and not only supervise but also supplement his work.

The ultimate objective with regard to Agricultural Statistics is to ensure that :

- (a) statistics of land utilization and area under different crops become available in respect of entire geographical area of the country ;
- (b) the estimates of production are made available for all the important crops including fruits and vegetables and minor commercial crops ; and
- (c) the reliability, accuracy and timeliness of the data collected is further improved.

Among the States where agricultural statistics are at present compiled by field to field enumeration, there are areas which are not cadastrally surveyed. The absence of cadastral maps affects the reliability of statistics. Unsurveyed areas where settled cultivation is practised should, therefore, be cadastrally surveyed.

For the inter-State comparability of Agricultural Statistics, the basic and abstract land records forms should ensure the collection of all the required basic agricultural statistics according to uniform concepts and definitions. In order to achieve this objective, a standing Committee on Improvement of Agricultural Statistics was set up. The Committee on Improvement of Agricultural Statistics has so far suggested revisions in the basic and abstract land records forms of most of the States with a view to collecting area statistics according to standardized classification and uniform concepts and definitions. The Committee has also examined the procedures for recording of areas under mixed crops followed in different states and recommended uniform procedures for adoption by all the States. This Committee has further suggested improvements in the recording of area under crops sown in one season but harvested in successive seasons, recording of area under bunds, area and yield statistics of

fruits and vegetables and statistics of irrigated areas. The Committee has also considered a few other aspects of agricultural Statistics including extension of crop-cutting surveys, extent of response and supervisions of these surveys and evolution of appropriate time-schedule for obtaining estimates of crop production based on the results of crop-cutting experiments much ahead of the time-schedule prescribed at present.

A Working Group on Agricultural Statistics reviewed the work done by the Committee on Improvement of Agricultural Statistics in suggesting ways and means to provide reliable and comparable area statistics from the basic land records and other improvements in the field of statistics of agricultural production. The main recommendations of Working Group are as follows :

1. The primary and supervisory land record agencies should be suitably strengthened in the States where they exist and established where they do not exist, so as to improve the quality, coverage and timeliness of area and yield statistics.
2. The revised land records forms as recommended by the Committee on Improvement of Agricultural Statistics should be introduced in all the States to ensure adoption of standardized classification and uniform concepts and definitions in the field of area statistics in the country.
3. The scheme of rationalized supervision of the work of area enumeration should be taken up on State-wise basis with the twin objective of introducing an element of surprise in the whole supervision programme and to serve as a quality check in area enumeration work of the primary reporters.
4. The crop-cutting surveys should be extended to the crops and areas not covered so far, so as to enhance the reliability of the crop production in the country.
5. These surveys should also be carried out for fruits and vegetable crops for which suitable sampling techniques for adoption on state-wise basis have now been evolved.
6. Surveys should also be conducted for obtaining estimates of crop production at the Block level.
7. The timeliness of preparation and release of crop forecasts and other agricultural statistics should be improved.

Steps are being taken to implement these recommendations as part of State and Central Plans subject to the availability of financial

and organizational resources. In order to make available the estimates of area of crops soon after sowings and their production soon after the harvests, a scheme entitled 'Timely Reporting' has been formulated. This scheme is being tried in the States of Maharashtra and Uttar Pradesh. On the experience gained in these States, it will be extended to other States also.

With a view to improve the quality of field work of area enumeration and yield estimation, a scheme for improvement of crop statistics which envisages an independent sample check over the work of the area enumeration and yield estimation done by the State Government, is under examination of the Government.

In order to have a deeper examination of the various problems involved in the construction of different series of index numbers relating to the agricultural economy, a Technical Committee was set up in the Ministry of Food, Agriculture, Community Development and Co-operation. The Committee reviewed the technical details of the various index number series on the sphere of agriculture and made far-reaching recommendations for improvements in the scope, coverage and methodology of the existing series. Action regarding the implementation of various recommendations has been initiated. It is expected that once these recommendations are implemented, the new series may provide a firm basis for assessment of the progress of agricultural development.

Timeliness in the Submission of Agricultural Statistics Return

The statistics of 'Land Utilization,' crop estimates, farm harvest prices and agricultural wages are used for various purposes such as food administration, formulation of import and export policies in respect of commercial crops, import programmes in respect of food-grain, price support, inter-State movement, formulation, implementation and assessment of plans for agricultural development, etc. Thus any delay in their availability detracts from their utility to the Government and the public. Usually such statistics are available not only to the public but to Government Departments as well after the lapse of quite a long time.

Suggestions for the elimination of the delays without any further loss of time are :

1. Reduction in the jurisdiction of the reporting agencies.
2. Appointment of district statistical officers.

3. Provision of adequate staff for compilation and processing of data at various levels.
4. Strict enforcement of rules for penalties for non-submission of returns in time.
5. Suggestions for estimation of data when actual figures are wanting for small areas, etc. have already been made from time to time by various Committees, Conferences etc., and the States have been approached to implement the same.

Much of the delay can also be avoided if some sort of a co-ordinating machinery is introduced for an expeditious disposal of statistical data at various levels. Some officer at the Block/Tehsil and District level may be specially charged with the responsibility of timeliness of the returns.

Simplifications in official procedures and routines could also go a long way in meeting the time targets. For example, submission of an advance copy of some of the returns by State Offices to the Ministry of Food and Agriculture at the Centre would help expedite matters. This would enable the time-lag between the finalization of returns and its formal approval by the State Administration to be utilized for purposes of compilation.

An allied problem relates to the question of simplifying some statistical procedures. This is also important from the point of view of timely compilation and release of information. The estimation of data for small areas or for items of minor importance when actual figures are wanting is an example in which a clear-cut statistical technique can be handy in reducing the delay.

Coverage

There is yet a gap between the total geographical area and that reported in village records. Even from the area under village records, there is a big chunk of about 90 million acres for which land utilization figures are based on estimates. Within the next few years, land utilization statistics and area under different crops should become available in respect of the entire geographical area of the country.

If the setting up of the primary reporting agency is likely to take time, it would be necessary to organize some sampling studies in the existing non-reporting or 'estimated' areas for providing *ad hoc*

estimates. In the inaccessible areas, where such surveys might not be possible, knowledge of the local officers, coupled with aerial photographs, will prove very helpful.

In all those States where agricultural statistics are being compiled by a field to field enumeration at the primary level, there are still areas which have not been cadastrally surveyed. All the unsurveyed areas where settled cultivation is practised should be cadastrally surveyed so as to provide a frame for the recording of crop and land utilization statistics accurately. During the Second plan, the total expenditure on cadastral surveys was considered as non-developmental and such schemes for these surveys were not included in State Plans. In the absence of financial assistance to States, it might not be possible for poor states like Orissa to incur any expenditure on this account.

Besides extending the coverage to the total geographical area, the new classification of land utilization, although officially adopted at the all-India level, has not been fully implemented down to the village records. The available data in the village records in States like the Punjab is being maintained according to the old classification. The figures at the State or District level are just manipulated to fit them into the new classification. For the inter-State comparability of agricultural statistics, the basic and abstract land records forms should ensure the collection of all the required basic agricultural statistics according to uniform concepts and definitions. In order to achieve this objective, a Committee on Improvement of Agricultural Statistics has been set up to examine the forms and to look into other aspects of improvement of agricultural statistics and give necessary guidance to the States with a view to effecting lasting improvement in the quality and content of agricultural statistics in the country.

Production Estimates

Although production estimates are now available for 34 forecast crops as against 10 before Independence, some important crops (though minor in nature) like fruits and vegetables are still left out. It is important that the methodological problems on which work is being done, should be settled soon.

Even from among these 34 crops where yield is estimated on the basis of the traditional method, it should be replaced by crop-cutting experiments. Under the crop-cutting system, agreement should be

reached about the shape and size of the cut, etc. which differ for the ICAR and the Indian Statistical Institute.

Just like the area, there are also two series of production—one that of the NSS and the other the official one. There is a wide difference between the two. This has created a good deal of confusion among the research workers, the Governmental agencies and the public in general. The whole question needs to be carefully examined and final decisions arrived at.

There are a number of crops like cotton, tea, coffee and rubber where two or even three different production estimates are being formulated. In the case of cotton, for instance, besides the official estimates, trade agencies and the Indian Central Cotton Committee formulate their own production estimates on the basis of the utilization of the crop. Table 53 gives these figures over the last two decades. In spite of the best efforts of the organizations concerned, the divergence between the various estimates still continues.

Similarly in the case of tea, coffee and rubber, along with the official estimates, the Indian Tea Board, the Indian Coffee Board and, the Indian Rubber Board, give production estimates which are different from those given by the State Governments. In respect of tobacco, too, alternative estimates are available from the Central Board of revenues which collect these data through the Excise Department. The Indian Central Tobacco Committee instituted a sample check in Guntur District of Andhra Pradesh during 1957-58 season, with the object of finding out the exact nature and causes for the discrepancy between the two sets of figures. No solution has yet been found.

This would indicate the necessity of bringing about a co-ordination between these different estimates so that only one final agreed figure is released. Similar reconciliation of the figures of acreage and production published in the Annual Season and Crop Reports and the Indian Agricultural Statistics as well as Estimates of Area and Yield brought out by the Government of India is necessary.

Pre-harvest estimates have necessarily to depend upon the traditional method of 'standard yield' and 'condition factor.' In spite of the improvements already introduced in the system, there are still wide variations between the earlier, final and the partially revised estimates. This gap should be reduced to the utmost. There is, in fact, the need to even revise these terms. 'Final' should be really the final estimate.

TABLE 53
ESTIMATES OF PRODUCTION OF COTTON BY DIFFERENT
AGENCIES

(Lakh bales of 180 kgs. each)

Year	Source			
	Government Estimate (revised)	Indian Central Cotton Committee		East India Cotton Association
		Formula I	Formula II	
1948-49	17.5	22.9	23.1	22.5
1949-50	26.0	29.7	27.1	29.5
1950-51	29.4	32.6	30.9	32.4
1951-52	30.9	37.7	37.7	37.2
1952-53	30.9	36.4	35.6	36.3
1953-54	39.2	45.6	43.5	45.3
• 1954-55 •	41.9	52.4	52.8	52.4
1955-56	39.6	45.8	44.1	45.5
1956-57	46.8	49.5	42.1	50.7
1957-58	96.9	50.0	55.9	53.6
1958-59	46.9	56.5	46.7	51.2
1959-60	36.8	41.8	36.0	41.40
1960-61	53.9	53.3	48.9	56.78
1961-62	45.1	—	—	49.70
1962-63	52.3	60.5	49.6	60.35
1963-64	54.3	—	—	64.00
1964-65	56.6	—	—	60.00
1965-66	47.6	—	—	56.08
1966-67	49.7	—	—	56.00
1967-68	54.5	—	—	62.70

Source : 1. *Study of Cotton in India*, Planning Commission, 1963.

2. *Cotton Situation*.

Under the existing terminology, the 'final' and again 'partially revised' and finally revised becomes what one may call as the final of the final.

As regards the production of livestock products—milk, meat, eggs, fish, etc., methodological research is needed. The two pioneering institutions—the Statistical Institute of the ICAR and the National Sample Survey should make a concerted effort to come to some conclusive results and evolve necessary techniques which can be immediately applied under field conditions.

Grow More Food Statistics

We have discussed at length the present position of data with regard to the use of fertilizers, manures, improved seeds, improved implements and other improved methods of cultivation. Such data are not available in a form which can be put to any use. Even with regard to irrigation data about which the position is much better, there is the need for co-ordination between the statistics being collected by the Central Board of Irrigation and those by the State Governments.

Under minor irrigation, there are big gaps. We do not know " the areas going out of irrigation every year due to wells and tube wells going into disuse. India is one of those countries where minor irrigation has a top position in the world, but the data still lack precision.

Distribution of the gross irrigated area source-wise is not known. This makes difficult a study of possibilities of increase in double cropping. There is the necessity to have a clear statistical picture of rainfall conditions, quantity of water available source-wise and the time when available.

Miscellaneous Data

Information on items connected directly or indirectly with agricultural productivity and agricultural economy of the country is as important as on others which have already been discussed. There is at present a big lacuna in our statistical machinery to collect reliable data on consumption, stocks (primarily private), cost of cultivation, capital formation in agriculture and other items discussed earlier.

In the case of all those items which go into human consumption like food and those which come into industrial consumption like cotton,

jute, etc., one can feel satisfied only when the balance sheet of production, consumption, imports, exports and stocks tallies after the data, collected from the different sources on each of the items, are processed.

Besides organizing the collection of fresh statistics which require primary compilation by the States, attention has also to be given to the proper processing and analysis of information. The utility of the collected data, whether they relate to production or prices, is considerably enhanced by properly processing them.

We have already with us the most reliable data on transfer of agricultural property, each village in the mutation register and the record of rights. There are States like those of Punjab, Madhya Pradesh and Delhi, in which such data are not consolidated beyond the Tehsil level. In others, it is not being extracted from the village records. If all the data in the village records are properly tabulated and processed, we can get a good deal of information on items like size of holdings, fragmentation, etc.

The present 'Season and Crop Reports' being issued by the State Governments do not in most cases go below the District level. In the future agricultural development of the country, the foundation of agricultural planning will be laid at the Block level. It would, under these circumstances, be very useful if these Season and Crop Reports contain information down to the Block level. This procedure will also help to tone up the primary reporting agencies who will know that all the data are also being published for each Block. Livestock data, for example, are being maintained in a very haphazard manner below the District level and in a number of cases, are just manipulated at the time of submission of returns.

The scope of livestock censuses has to be widened to get a clear picture of the different breeds of cattle and buffalo. Such an information in the case of breeding stock—male and female—is very essential for any future planning of the animal husbandry sector. Similar break-ups would be useful under poultry. Data on piggeries, etc. which may be of great importance in the near future will also have to be properly collected.

A P P E N D I C E S

APPENDIX 1

IMPORTANT PUBLICATIONS RELATING TO AGRICULTURAL STATISTICS

<i>S. No.</i>	<i>Name of Statistical Unit</i>	<i>Name of Publication</i>	<i>Nature of Publication</i>
(1)	(2)	(3)	(4)
1.	Directorate of Economics and Statistics.	1. Bulletin on Agricultural Prices	Weekly
		2. Agricultural Situation in India	Monthly
		3. Indian Agricultural Statistics, Vols. 1 and 2	Annual
		4. Estimates of Area and Production of Principal Crops in India, Vols. 1 and 2	"
		5. Area, Production and Average Yield per acre of Forecast Crops in India	"
		6. Jute in India	"
		7. Sugar in India	"
		8. Oilseeds in India	"
		9. Tobacco in India	"
		10. Tea in India	"
		11. Coffee in India	"
		12. Rubber in India	"
		13. Lac in India	"
		14. Cotton in India	"
		15. Abstract of Agricultural Statistics, India	"
		16. Indian Agriculture in Brief	"
		17. Indian Cotton Pressing Factories and Returns	"
		18. Bulletin on Food Statistics	"
		19. Indian Agricultural Wages Statistics	"
		20. Indian Land Revenue Statistics	"
		21. Indian Forest Statistics	"

(1)	(2)	(3)	(4)
		22. Quinquennial Average Yield per acre of Principal Crops in India	Quin- quennial
		23. Agricultural Prices in India	"
		24. Agricultural Wages in India	"
		25. Indian Agricultural Atlas	Decennial
		26. Agricultural Legislation in India Vol. I to VIII	<i>ad hoc</i>
		27. Agricultural Prices in India, 1951- 52	<i>ad hoc</i>
		28. Indian Livestock Statistics,	"
		29. Rice Economy of India	"
		30. Indian Livestock Census Vol. I and II	Quin- quennial
		31. Guide to Jute Statistics	<i>ad hoc</i>
		32. Guide to Cotton Statistics	"
		33. Guide to Oilseeds Statistics	"
		34. Guide to Sugar Statistics	"
		35. Guide to Current Agricultural Statistics (Revised)	1961
		36. Studies in Agricultural Economics Vol. I, II, III	1954
		37. Crop Calendar	Casual
		38. Agricultural Statistics of Re-orga- nised States	1956
		39. Indian Food Statistics	1939-1953
		40. Studies in the Economics of Farm Management Reports for West Bengal, Uttar Pradesh, Madras, Punjab, Bombay, Madhya Pradesh, Orissa and Andhra Pradesh	1954-55 to 1957-58
		41. Report on Market arrivals of Food- grains	1958-59
		42. Economic Survey of Indian Agri- culture	Annual

(1)	(2)	(3)	(4)
2. Statistical Wing of the Indian Council of Agricultural Research.	1. Scientific Report of the ICAR	Annual	
3. Statistical Branch of Forest Research Institute	1. The Efficiency of Enumeration 1949	<i>ad hoc</i>	
	2. Application of Statistical Quality control in wood based industries, 1949	<i>ad hoc</i>	
	3. Statistical Methods in Forest Product Research, 1953	<i>ad hoc</i>	
	4. Statistical Methods in Forest Research	<i>ad hoc</i> 1953	
	5. Statistical Sampling in Timber Surveys	1957	
4. Central Rice Research Institute, Cuttack	1. Manual of Rice in India, R.L. Sethi, 1952	<i>ad hoc</i>	
	2. Assessment of Response to Ammonium Sulphate in Cultivator's Field for Rice Crop	1952	
	3. Discriminant Functions for Varietal Sections in Rice	1954	
5. Statistical Unit of Sugar and Vanaspati	1. Indian Sugar Trade Information Service	Daily	
	2. Indian Sugar Trade Information Service	Weekly	

APPENDIX 2

LIST OF STATE STATISTICAL BUREAUS AS ON 6.1.1970

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| <p><i>States</i></p> <ol style="list-style-type: none"> 1. Director, Bureau of Economics & Statistics, Government of Andhra Pradesh, Khairatabad, Post Box No. 5, <i>Hyderabad-4</i>. 2. Director of Statistics, Department of Economics & Statistics, Government of Assam, Taxation Building, <i>Shillong-1</i>. 3. Director of Statistics & Evaluation-cum-Additional Secretary (Finance), Directorate of Statistics, Finance Department Govt. of Bihar, Mangles Road, <i>Patna 6</i>. 4. Director, Bureau of Economics & Statistics, Government of Gujrat, L.D. Engineering College Premises, <i>Ahmedabad-9</i>. 5. Economic & Statistical Adviser, Economic & Statistical Organisation, Government of Haryana, 30, Bays Building, Sector 17, <i>Chandigarh</i>. 6. Director Evaluation & Statistics, Directorate of Economics & Statistics, Government of Jammu & Kashmir, <i>Srinagar/Jammu</i>. 7. Director Bureau of Economics & Statistics, Government of Kerala, <i>Trivandrum-1</i>. 8. Director Directorate of Economics & Statistics, Government of Madhya Pradesh, Benazir Building, <i>Bhopal</i>. 9. Director Bureau of Economics & Statistics, Government of Maha- | <p>rashtira, D.D. Building (4th Floor), Old Custom House, <i>Bombay-1</i>.</p> <ol style="list-style-type: none"> 10. Director Bureau of Economics & Statistics, Government of Mysore, Multi-storied Building, (VI Floor) Post Office Road, <i>Bangalore-1</i>. 11. Research Officer (Statistics), Nagaland Secretariat, <i>Kohima</i>. 12. Director Bureau of Statistics & Economics, Finance Department, Government of Orissa, <i>Cuttack-1</i>. 13. Economic Advisor, Economic & Statistical Organisation, Government of Punjab, Shop-cum-Flat 35 & 36, Sector 17, <i>Chandigarh</i>. 14. Director Directorate of Economics & Statistics, Government of Rajasthan, Krishi Bhavan, <i>Jaipur</i>. 15. Director of Statistics, Department of Statistic, Government of Tamil Nadu, Block 11, Central Offices Buildings, Teynampet, <i>Madras-6</i>. 16. Director Department of Economic Intelligence and Statistics, Govt. of Uttar Pradesh, 9, Sarojini Naidu Marg, <i>Lucknow</i>. 17. Director Bureau [of Applied Economics & Statistics, Govt. of West Bengal, 1, Kiron Sankar Roy Road, <i>Calcutta-1</i>. <p><i>Union Territories</i></p> <ol style="list-style-type: none"> 18. Statistical Officer, Department of Statistics, Andaman & Nicobar Islands, Chief Commissioner Secretariat, <i>Port Blair</i>. |
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19. The Administrator, Union Territory of Chandigarh, *Chandigarh*.
20. Secretary to the Administrator, Dadra & Nagar Haveli, *Silvassa*.
21. Director Bureau of Economics & Statistics, Delhi Administration, 13-Alipur Road, Exchange Building, *Delhi*.
22. Director General Statistical Department, Government of Goa, Daman & Diu, *Panaji*.
23. Director Directorate of Economics & Statistics, Himachal Pradesh Administration, "Simla Hotel", *Simla* 1.
24. The Administrator, Laccadive, Minicoy & Aminidive Islands, Secretariat of Union Territory of Laccadives, *Kozhikode*.
25. Statistical Officer, Statistical Bureau, Manipur Administration, *Imphal*.
26. Statistician, North East Frontier Agency, *Shillong*.
27. Director of Statistics & Evaluation, Directorate of Statistics & Evaluation, *Pondicherry-1*.
28. Senior Statistical Officer, Statistical Department, Tripura Administration, *Agartala*.

APPENDIX 3

STATE AUTHORITIES RESPONSIBLE FOR THE SUPPLY OF CROP-FORECAST

1. The Director, Bureau of Economics, Andhra Pradesh, 410, Khairathabad, *Hyderabad-4*.
2. The Director of Statistics, Assam, *Shillong*.
3. The Director, Directorate of Statistics & Evaluation, Finance Department, Bihar, *Patna*.
4. The Director of Agriculture, Gujarat State, *Ahmedabad*.
5. The Director of Land Records, Haryana, Kothi No. 53, Sector 4-B, *Chandigarh*.
6. The Director, Directorate of Economics & Statistics, Jammu & Kashmir Government, *Srinagar/Jammu*.
7. The Additional Director, Bureau of Economics & Statistics, Kerala, *Trivandrum*.
8. The Director of Land Records, Madhya Pradesh, *Gwalior*.
9. The Director of Statistics, Department of Statistics, Block II, Central Offices Building, Govt. of Tamil Nadu, *Madras*.
10. The Statistician, Department of Agriculture, Maharashtra State, *Poona-1*.
11. The Director of Statistics in Mysore, Multi-storeyed Building, *Bangalore*.
12. The Research Officer, Statistics, Nagaland, *Kohima*.
13. The Director of Agriculture & Food Production, Govt. of Orissa, *Bhubaneswar*.
14. The Director of Land Records, Punjab, *Jullundur*.
15. The Director of Economics & Statistics, Rajasthan, *Jaipur*.
16. The Joint Director of Agriculture, U.P. Krishi Bhavan, Madan Mohan Malviya Marg, *Lucknow*.
17. The Agricultural Economist & Addl. Director of Agriculture, Socio-Economic & Evaluation Branch, 17-Shyama Prasad Mukherjee Road, *Calcutta*.
18. The Statistical Officer, Statistical Bureau, Andaman & Nicobar Islands, *Port Blair*.
19. The Administrator, Dadra Nagar Haveli, *Silvassa*.
20. The Statistical Officer, Bureau of Econ. & Statistics, Exchange Building, 13 Alipur Road, *Delhi-6*.
21. The Director of Agriculture, Directorate of Agriculture, Goa, Daman and Diu, *Panaji*.
22. The Director of Land Records, Himachal Pradesh, *Simla-1*.
23. The Secretary to the Administrator, Union Territory of Laccadive, Minicoy and Amindivi Islands, *Kozhikode*.
24. The Statistical Officer, Statistical Bureau, Manipur Administration, *Imphal*.
25. The Director, Directorate of Agriculture and Community Development, NEFA, *Shillong*.
26. The Director of Statistics and Evaluation, Bureau of Statistics and Evaluation, Government of Pondicherry, *Pondicherry-1*.
27. The Director of Agriculture, Tripura, *Agartala*.

APPENDIX 4

INSTRUCTIONS FOR CROP CUTTING EXPERIMENTS¹

Wheat

Madhya Pradesh

SECTION I

SELECTION OF FIELDS

In each Revenue Inspector Circle a certain number of villages are selected for crop cutting experiments. In each selected village two fields sown with wheat are to be selected at random. In each selected field one rectangular plot of size $33' \times 16\frac{1}{2}'$ (1/80th of an acre) is to be located at random.

A field for the purpose of the experiments is understood to mean a distinct patch or portion of land which has no bunds within it other than small irrigation bunds and which is demarcated on all its sides either by means of a bund or a narrow strip of uncultivated land or by means of a crop or crops different from the one grown in the patch. Generally it will correspond to what is known by the name of *Kairi*, *Doli* or *bandhi* in different local languages. A Khasra number may contain one or more sub-numbers and a sub-number may contain one or more fields defined as above. The selection of a field will, therefore, have to be done in three distinct steps: (1) selection of a Khasra number, (2) selection of a sub-number within a khasra number and (3) selection of a field shown with wheat (whether pure or mixed) within the selected sub-number.

Selection of Khasra numbers

Find out from the Khasra register if the number of wheat growing khasra numbers in a selected village is small, say 99 or less. If so, it will be convenient to prepare a list of all the wheat growing khasra numbers and select therefrom two numbers as per procedure 'A' given below. If, however, the number of wheat growing khasra numbers in a village be 100 or more, proceed as per procedure 'B'. By a Khasra number growing wheat is meant one which contains at least one field sown with wheat.

1. Instructions for other crops and other states are essentially similar.

Procedure A

Prepare a list of all Khasra numbers having at least one field under wheat on form 'IA' provided.

Enter 'against each wheat growing Khasra number its serial number assigning number 1 to the lowest khasra number, number 2 to the next higher Khasra number and so on ending with the serial number corresponding to the highest khasra number under wheat.

Out of these serial numbers, select two numbers with the help of random number list provided. If the highest serial number in a village is less than 10, use list of one-digit random numbers provided. If, however, the highest number is a two-digit number, i.e., between 10 and 99 inclusive of both, use the list of two-digit random numbers provided for the selection of fields.

The method of selecting fields is illustrated below :

Suppose there are seven Khasra numbers growing wheat in a selected village. Two random numbers from 1 to 7 are to be selected in this case. Since 7 is a one-digit number, refer to the list of one digit random numbers and start reading them down from the column assigned. Suppose the first column is the one assigned. Then the first two numbers not greater than 7 are 6 and 2. And the Khasra numbers corresponding to these serial numbers are to be selected for crop-cutting experiments. Or again, suppose there are 60 Khasra numbers under wheat in a selected village. Two numbers from 1 to 60 are to be selected in this case. Since 60 is a two-digit number refer to the list of two-digit random numbers and start reading them down from the column assigned. Suppose column (6) in the list of two-digit random numbers is the one assigned, and suppose that the first eight numbers including 01 have already been used up by you in selecting Khasra numbers earlier. The first two numbers not greater than 60 that occur after 01 are 51 and 57. The Khasra numbers corresponding to these serial numbers are then to be selected for crop-cutting experiments.

A khasra number in a village will be selected once only for the purpose of experiments. If a khasra number gets selected twice in the same village by virtue of repetition of the same number in the list of random numbers provided, select another in its place by reading down the list of random numbers. Selection of the number zero from the random list should likewise be disregarded.

If a selected khasra number does not contain at least one field sown with wheat which can accommodate the experimental plot of $33' \times 16\frac{1}{2}'$ (1/80 acre), it should be rejected and another Khasra number in its place should be selected with the help of random numbers by reading further down the column.

Random numbers should be ticked off as they are used. A circle should be drawn round the selected numbers in the list of random numbers. Thus in the first example mentioned above, tick-off from the list of random numbers the first two numbers, viz., 6 and 2, and a circle round each since they are selected. In the second example tick off all numbers from 51 to 57 and draw a circle round each of the selected numbers, viz., 51 and 57. In using the random number list on the next occasion proceed further down the column beyond the last selected number, viz., 57, in this case. When a column is exhausted proceed to the next higher column number.

Procedure B

Find out the highest khasra number in the selected village. If it is less than 1,000, use the list of three-digit random numbers. If, however, it is a four-digit number, use the list of four-digit random number. In either case start reading downwards from the column assigned to you.

The Procedure is illustrated below :

Example 1. Suppose the highest khasra number in a selected village is 511 and the column 3 of the random number list is assigned to you. Since 511 is a three-digit number, use the list of three-digit random numbers and start reading down column 3. Suppose further that the first ten numbers including 354 have already been consulted by you. The first number not greater than 511 beyond 354 is 168. Find out if 168 is wheat growing khasra number. If it is, select it and proceed further down the list to select the second khasra number. The next random number not greater than 511 beyond 168 is 268. Suppose khasra number 268 does not grow wheat. Reject it and proceed as before. The next random number not greater than 511 beyond 268 is 055. Suppose that khasra number 55 grows wheat, select it. The khasra numbers thus finally selected for experiments are 168 and 55. In consulting 3 digit list next time read further down the column beyond the last selected number, viz., 055 and select as before.

Example 2. Suppose there are 2,114 khasra numbers in another selected village. 2,114 being a four-digit number, use the list of four-digit random numbers and start reading down the column assigned to you. Suppose column 3 of four-digit random numbers is the one assigned. Then start reading downwards from the first number of this column, viz., 1,085. The first two numbers not greater than 2,114 are 1085 and 0713. These then would be the khasra numbers selected for experiments. But suppose that of these khasra number 713 is not a wheat growing number in the sense defined earlier. Then reject it and select the next random number not greater than 2,114 beyond 0713, viz., 0776. The khasra numbers thus finally selected for experiments are 1085 and 776.

In making further use of the four digit random number list read further down the column beyond the last selected number, viz., 0776, and proceed as before.

Selection of Sub-numbers

In each of the Khasra numbers finally selected in a village select one sub-number from amongst all the sub-numbers in the khasra number by the following procedure :

Suppose a selected khasra number, for example, 168 has 8 sub-numbers, viz., 168/1, 168/2, 168/3A, 168/3B, 168/4, 168/5A, 168/5B, 168/6 and further that sub-numbers 168/3A and 158/5B, do not have any field growing wheat. List the remaining sub-numbers in serial order, thus :

<i>Sub-numbers</i>	<i>Serial number</i>
168/1	1
168/2	2
168/3B	3
168/4	4
168/5A	5
168/6	6

Since the number of sub-numbers growing wheat in this case is 6, one-digit number, use the one-digit list of random numbers and start reading downwards beyond the position last consulted by you. The last number used by you is 2, the third number in the column assigned

(vide example 1, para 4). Reading beyond 2 in the column, the first random number not greater than 6 is 4. The sub-number corresponding to this serial number is 168/4 which should be selected.

If the number of sub-numbers growing wheat in a Khasra number runs into two-digits, e.g., 11, list the sub-numbers growing wheat as before, number them from 1 to 11 and select a random number not greater than 11 by reading downwards beyond the last number used in the two-digit random numbers, as explained above. The sub-number corresponding to this serial numbers will be selected for experiments.

Selection of a Field

If there are two or more wheat growing fields as defined above, within a sub-number, number them serially starting from say the southern side and then moving up to the eastern, northern and western sides until all the fields under wheat within the sub-number have been listed. Use the list of random numbers to select one field at random in the manner indicated earlier.

SECTION II

LOCATION AND MARKING OF AN EXPERIMENTAL PLOT

In each selected field one rectangular plot of $33' \times 16\frac{1}{2}'$ is to be located at random. This is not to be done earlier than on the day already fixed for harvesting. Before a plot is located, make sure that the field is the one already selected by you. The procedure of locating a random plot is as follows :

Stand facing north with the field in front of you and to your right. This corner of the field (south-west corner) will be the starting point. When the sides of a field are not north-south and east-west, the direction towards which you should face to determine the starting point will be approximately North. For convenience fix a peg at the starting point.

Beginning from the starting point measure by means of a tape, the length and the breadth of the field in feet, fraction being rounded off to the next higher number. Next deduct 33 from length and 17 (in place of $16\frac{1}{2}$ for convenience) from the breadth and obtain respective remainders. Now select two random numbers, one each for the length and breadth and not exceeding the respective remainders obtained by consulting the random number lists of appropriate digits

in the manner already explained. The pair of random numbers so selected will determine the south-west corner of the plot to be marked.

Suppose the pair of random numbers selected for locating the plot is say (064, 23). To mark the plot by means of this pair of random numbers walk from the starting point of the field along its length and stop at a distance of 64 ft. Having arrived at this point, walk into the field along the breadth and stop at a distance of 23 ft. Fix a tall straight bamboo peg at this point, which will be the starting point for the plot.

Tie a string to the peg fixed at this point, stretch it along the direction of the length of the field away from its starting point and measure $133\frac{1}{2}$ feet along it and fix another peg at this point. At this point put the cross-staff. Turn the string round the cross-staff, stretch it at right angles away from the starting point of the field and measure $16\frac{1}{2}$ ' along it. This will be the third corner of the plot provided the distance of the diagonal between the first peg and this point is $36'10\frac{1}{2}"$. Check the measurement of the diagonal over the ear-heads. Fix a third peg at this point, use the cross-staff, turn the string round the peg, and stretch it parallel to the direction of the length of the field towards the starting point measuring 33' reaching the fourth corner of the plot. This will be the point for the fourth peg provided the diagonal distance from the second peg to this point is exactly $36'10\frac{1}{2}"$. Check the diagonal. Fix a fourth peg at this point, turn the string round the peg, stretch it to the starting corner of the plot and tie it to the first peg. Check the distance between the fourth and the first peg, which should be $16\frac{1}{2}'$. The pegs should be tall, straight and firmly fixed into the ground. See that the string is fully stretched on all the four sides. Lower the string to the level of the ground.

If the whole of the plot does not fall within the field owing to slight irregularities in its shape, reject the pair of random numbers both for the length and breadth and mark the plot over again using a fresh pair of random numbers obtained by reading further down the columns in the manner explained. If, however, a located plot falls wholly within the field, take the position of the plot so marked as final notwithstanding whether the crop inside the plot is poor or otherwise.

SECTION III

HARVESTING AND OTHER OPERATIONS

Harvest the crop which is only within the boundary of the plot. If a bunch of plants lies on the boundary of the plot, include it

if more than half of it is inside the plot, otherwise reject it. It is advisable not to allow the surrounding crop of the field to be harvested until the crop within the plot is harvested and removed to the threshing ground.

Complete the harvesting before noon, collect all the harvested produce without leaving any ear-heads in the plot and spread it on a piece of cloth for a few hours before threshing and winnowing it. The produce should be threshed by trampling under feet or by beating with a wooden rod on hessian cloth and winnowed with *scoops*. Take care to see that there is no loss in the produce at the various stages, viz., harvesting, separating, carrying from the field to the threshing ground, threshing, winnowing, cleaning and weighing. Particular care should be taken to see that every grain is separated from the ear-heads as also obtained free from dust. Weigh the cleaned produce carefully. Weighment should be made to the nearest half chhattank. In the case of mixed crop, the weight of component crops should be recorded separately. Complete all the operations for a field on the same day but where the produce is moist and it is difficult to separate the grain from ear-heads, it should be allowed to dry up for a day or two under the care of the *Patwari*. But the threshing must be done in the presence of the revenue inspector who will then record the results of weighment.

Record the results of weighments obtained on the day of threshing in Form I provided for the purpose and dispatch the form along with Form 'IA' immediately as per instructions contained therein.

SECTION IV

ALLOWANCE FOR DRIAGE

Operations for estimating the allowance for diriage will be conducted by a revenue inspector for the first plot harvested in each of the first two villages allotted to him for the purpose of experiments. The operations are as follows :

Immediately after the produce of a plot is weighed, store the whole of it in a small bag. Seal the bag, label it properly and deposit it in your office. The bag should be exposed to the sun every day unopened for about a fortnight till the inside grain is well dried.

At the end of the period, weigh the contents of the bag carefully, record the results of re-weighing and other particulars in Form 2 provided and dispatch it as instructed therein. Take care to see that the re-weighment is done with the same set of scales and weights as were used at the time of initial weighment. Return the produce to the owner after the grain has been re-weighed.

CROP CUTTING SURVEY

Form No. 1

Wheat

Madhya Pradesh

PARTICULARS OF SELECTED FIELDS AND RESULTS OF HARVESTING

Name of Revenue Inspector.....

District.....Tehsil.....Circle.....

Name of village.....Patwari Circle No.....

1 (a) *Total agricultural
area in the village
(in acres).

1 (b) Gross area under wheat in the village (in acres).	Pure wheat Wheat-gram Wheat-barley Wheat-	Irrigated	Unirrigated

2 (a) Highest khasra number
in the village.

2 (b) Column consulted from
the random number list
for selecting fields.

2 (c) Khasra number rejected, if any, and reasons for rejection.	Khasra numbers rejected.	Reasons for rejection.

2 (d) Random numbers chosen
for selection of khasra
numbers.

2 (e) Khasra numbers finally
selected.

*The agricultural area is obtained by adding to the area under all crops, current and old fallow as also culturable waste and subtracting therefrom the double cropped area.

2 (f) Gross area under wheat
in the selected khasra
number

2 (g) Sub-numbers growing wheat in the selected khasra numbers.	Serial number	Sub- number	Serial number	Sub- number
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2 (h) Corresponding sub-
numbers selected.

2 (i) Gross area under wheat in
the selected sub-number.

2 (j) Number of fields in the sub-number.	Growing wheat " others Total
--	------------------------------------

3 (a) Length and breadth of the selected field in feet.	Length	Breadth	Length	Breadth
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3 (b) Remainders after deducting 33 feet from the length and 17 feet from the breadth.	Length —33	Breadth —17	Length —33	Breadth —17
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3 (c) Column of random number list consult- ed for the location of plots.	1 digit 2 digits 3 digits
--	---------------------------------

3 (d) Pair of random numbers selected.	Length	Breadth	Length	Breadth
---	--------	---------	--------	---------

4. Name of crop or crops, mixed, if any, and their respective propor- tions in the mixture, in fractions (see N.B. (i) below).	Wheat Gram Linseed Other crops
---	---

5. Weight of grain (correct to the nearest half a chhattank).	Wheat Gram Linseed Other crops	Seers	Chhattank	Seers	Chhattank
--	---	-------	-----------	-------	-----------

- 6 (a) Irrigated or unirrigated
 (i) as found in khasra register
 (ii) as found by spot inspection
 and personal enquiry.
-

- 6 (b) Source of irrigation.
-

7. **1** Soil

- (a) Kind.
 (b) Position
 (as per settlement
 classification).
-

8. Name of last crop (a) grown
 in the field and the month
 and the year in which it was
 harvested.
-

9. Kind and quantity of manur-
 ing in :
 (a) Previous season.
 (b) Current season.
-

10. Variety of wheat (mention
 with name if Local or Im-
 proved).
-

11. Time of sowing
 (early, normal or late).
-

12. Is this field a recipient of
 aid under any of the Grow
 More Food Schemes ? If so,
 state the nature of G.M.F.
 aid received.
-

13. Date of harvesting.
-

14. Remarks :

(a) Damage by rust (severe, light or nil).

(b) Damage by other factors like frost, rats, wild animals, kars, etc. and the intensity of damage (severe, light or nil).

(c) Abnormal weather conditions like hailstorms, drought, etc.

(d) Any particular factor that affects the growth of the crop in the located plot in a way different from that of the crop in the field.

Signature of
Supervising Officer
Designation
Date

Signature of
Revenue Inspector
Date

N.B. (i) If any crop mixed with wheat has already been harvested, state so and ascertain its proportion from the cultivator.

(ii) Prepare two copies of this form and send one immediately to the Statistician at the State Headquarters.

CROP CUTTING SURVEY

Form No. IA

Wheat

Madhya Pradesh

LIST OF WHEAT GROWING KHASRA NUMBERS

Name of Revenue Inspector.....R.I. Circle No.....
 District.....Tehsil.....P.C. No.....
 Village.....

<i>Serial number</i>	<i>Khasra number with sub-number, if any.</i>	<i>Serial number.</i>	<i>Khasra number with sub-number, if any.</i>	<i>Serial number.</i>	<i>Khasra number with sub-number if any</i>
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Prepare two copies of this form and send one along with Form I containing results of harvesting to the Statistician at the State Headquarters.

CROP CUTTING SURVEY

Form No. 2

Wheat

Madhya Pradesh

RESULTS OF DRIAGE

Name of revenue inspector..... R.I. Circle.....
 District..... Tehsil..... P.C. No.....
 Village.....

Name of village and P.C.	Selected Khasra No. Sub-	Date of harvesting	Weight of wheat on date of threshing	Date of re-weigh-ment.	Weight of after driage at the time of re-weigh-ment	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Sr. Chh.	Sr. Chh.		

Date.....

Signature.....

- Note. (1) Record the weights to the nearest half a chhattank.
 (2) Column (6) excludes the weight of bag since the original weight refers to the weight of grain only.
 (3) Prepare two copies of this form and dispatch one on the day of re-weighment to the Statistician at the State Headquarters.

APPENDIX 5

A NOTE ON THE SAMPLE DESIGN AND ESTIMATION PROCEDURE FOLLOWED IN THE NSS CROP SURVEYS DURING THE 13TH TO 20TH ROUNDS (1957-58 TO 1965-66)

1. *Design*

THE SAMPLE design for land utilization survey was stratified two stage one with provision for 2 or more independent interpenetrating (network of) sub-samples. Villages were chosen as the first stage units and cluster of plots, the second stage units. For crop-cutting experiments, a four stage design was followed with villages, clusters of plots, fields growing specified crops, and circular cuts of radius 4 feet as the successive stages of sampling units.

Allocation of sample villages. In 1957-58, the total number of sample villages were first allotted to different states on the basis of the strength of available investigating staff. The allotted number of villages in a state were then distributed to the districts on a joint consideration of intensity of cultivation and geographical area of the districts. From 14th round (1958-59) onwards, the crop survey and socio-economic inquiries were conducted in an integrated manner in the same set of sample villages. In 1958-59 and 1959-60 (i.e., 14th & 15th rounds) for the purposes of the allocation, additional factors, viz., the rural population, geographical area, crop acreages and number of persons engaged in household enterprises were also considered. From 1960-61 to 1963-64, area under food crops was considered and from 1964-65 onwards, the area under cereal crops (instead of area under food crops) was considered besides rural population and strength of investigating staff. The samples allotted to a state were further distributed to the regions in that state in proportion to the rural population of the regions in 1960-61 and 1961-62 and in proportion to the total size (related to population) of the regions from 1962-63 onwards.

Stratification. In 1957-58, districts or groups of adjoining districts formed the strata.

Since 1958-59 onwards, strata were formed by grouping contiguous

ous tehsils so that the populations of all strata within a State were more or less equal and the same number of sample villages was selected from each stratum for a round. In 1958-59 strata were formed by grouping contiguous tehsils which were homogeneous with respect to population density, altitude above sea-level and food crops so that strata populations were approximately equal.

For the years 1960-61 and 1961-62, the total sample size allotted to a state was further distributed to the different agricultural regions in proportion to their rural populations, the agricultural regions being formed by grouping contiguous districts (of a State) having similar cropping pattern and population density. Contiguous tehsils within a region, homogeneous with respect to population density were grouped together to form strata so that population of each stratum in a State was more or less same.

From 1962-63 to 1965-66 contiguous tehsils or parts of contiguous tehsils, homogeneous with regard to certain criteria, formed the strata. The criteria for homogeneity were similar population density, crop pattern and good communication facilities among the tehsils in a stratum. During these years strata in a state were formed in such a manner as to make the sum of the sizes of the villages in each stratum equal. The size of a village was defined as the census population of the village rounded off to the next higher multiple of 1,000 for the years 1962-63 and 1963-64 while for 1964-65 and 1965-66, it was taken as ratio (rounded off to the integer) of the village population to the average population of villages in the population class 0=199 of that State.

Interpenetrating net-work of sub-samples (IPNS). In the NSS, the samples were selected in the form of several independent sub-samples selected in an identical manner. The investigators were grouped into 2 parties in all the rounds except in the 17th round where there were three parties. The work of one or more sub-samples was allotted to a distinct party of investigators. The number of sub-samples for land utilization as well as for crop cutting was two for each of the years 1957-58 to 1960-61 and 1962-63 and three for 1961-62. From 1963-64 onwards, there were four sub-samples for land utilization survey, and crop-cutting experiments were carried out in half the number of villages of each of the sub-sample 1 and 2.

Selection of villages. In 1957-58, villages were selected with probability proportional to geographical area with replacement. From

1958-59 to 1961-62, villages were selected systematically with equal probability while from 1962-63 onwards, they were selected with probability proportional to village size, the size being defined as the village population rounded off to the next higher multiple of 1,000 for 1962-63 and 1963-64 and as the ratio of the village population to the average population of a village in the population class 0=499 of the state for 1964-65 and 1965-66. It may be mentioned that the same set of villages were surveyed during 1958-59 and 1959-60 and 50 per cent of samples were kept common between 1964-65 and 1965-66.

Selection of sample plots in villages. From 1957-58 onwards, clusters of plots were selected systematically with equal probability. Eight clusters of 10 plots each were selected per village in 1957-58. From 1958-59 to 1960-61, 6 clusters of 10 plots each per village were selected. From 1961-62 onwards, in villages selected for crop-cutting, 6 clusters of 10 plots each per village were selected. In villages chosen for land utilization without crop-cutting, 8 clusters of 5 plots per village were selected in 1961-62 while in the subsequent years this had been reduced to 4 clusters of 5 plots each. The same set of plots were surveyed in each of the seasons. Till 1961-62, the survey for summer season was not planned in the NSS. From 1962-63 onwards, summer season was also covered.

Selection of fields for crop-cutting. Out of the plots selected for land utilization those plots growing the specified cereal crops (rice, jowar, bajra, ragi, maize, wheat and barley) of each season formed the frame for selection, the number of fields selected for crop-cutting was five per season per village in 1957-58. From 1958-59 onwards, 6 fields per season were selected for crop-cutting in each village. In 1957-58, the fields for crop-cutting for a season were selected from all the plots (growing the specified crops of that season) with probability proportional to total allocated area under the specified crops of that season and with replacement. In 1958-59, the sample fields were selected systematically with probability proportional to allocated area under the crop after arranging the plots growing the specified cereal crops in a specified order. From 1959-60 to 1961-62, 6 sample fields were allocated to the different crops in proportion to the gross area under each so that at least one field would be allocated to each crop. The allotted number of fields for a crop were selected

systematically from field growing the crop with probability proportional to gross area. Upto 1959-60, in a selected field, one experiment per order of selection was conducted on a crop. But from 1960-61 onwards, in fields growing jowar, bajra, maize, wheat mixed and barley mixed, two sample cuts per order of selection were conducted. From 1961-62 onwards in fields growing ragi also, two sample cuts per order of selection were conducted. But from 1962-63 onwards, no allocation of sample fields was done to different crops. The sample fields were selected from all the fields growing the specified crops systematically with probability proportional to the crop area after arranging the fields in a certain specified manner.

2. *Estimation procedure*

Area. In 1957-58, the crop area at village was estimated on the basis of total number of plots in the village and the crop area in all the sample plots of the village. The stratum estimate of area was obtained by multiplying the village estimates by the inverse probability of selection of the respective villages. From 1958-59 to 1961-62, strata were grouped into two types—those belonging to hilly areas and the rest (i.e. not hilly). For the strata in hilly areas, stratum estimates of crop acreages were obtained based on the total number of plots in the village and the total number of villages in the stratum. In case of other strata, an estimate of proportion of crop area for the stratum was obtained by weighting the village estimate of proportion by the geographical area of the village, the village estimate of proportion being the ratio of the crop area in all the sample plots to the total geographical area of the sample plots. The stratum estimate of crop acreage was obtained by multiplying the stratum geographical area and the estimated proportion of crop area in the stratum. From 1962-63 onwards, the procedure of estimation for all the strata were similar to the one followed in 1957-58.

Production. In 1957-58, an estimate of production on the basis of villages selected for crop-cutting was obtained first at stratum level by inflating the village production estimates using inverse probabilities as weights. The village production estimate was obtained by multiplying the village estimate of allocated area under the crop and the corresponding mean yield of all cuts on the crop in the village. The stratum production was finally obtained by using the yield rate from the estimates of production and allocated area from the crop-cutting

villages and the estimate of allocated area based on all the villages.

From 1958-59 onwards, estimate of production was obtained separately for the pure crop and the crop grown in mixture. The mean gross yield rate of crop was obtained separately for pure crop and mixed crop for each stratum. The production estimate of the crop in each of the two categories was obtained by multiplying the gross area and the corresponding gross yield rate of crop (unweighted). Upto 1960-61 the estimate for all sub-samples combined was obtained in the same manner as that for each sub-sample. But from 1961-62 onwards, the estimate for the combined sample was taken as the mean of the sub-sample estimates.

Source : Report of the Technical Committee of Crop Estimates, *op. cit.*

APPENDIX 6

DESIGN AND ESTIMATION PROCEDURE GENERALLY FOLLOWED IN THE OFFICIAL SERIES OF CROP ESTIMATION SURVEYS

Plan of sampling and experimental procedure. The plan of sampling adopted in the crop estimation surveys in various States is one of stratified multistage random sampling with tehsils/revenue inspector circles/sub-divisions as strata (containing about 100 to 300 villages), a village as primary unit of sampling, a field growing the specified crop (pure or in mixture with other crops) as the secondary unit of sampling and a plot as the ultimate unit of sampling. The general plot size is 10 m×5 m. The actual experiment consists of carefully marking at harvest time an experimental plot of specified size in the sample field and harvesting, threshing, and weighing the produce within it. The produce so weighed is in terms of grain in the case of paddy, wheat, gram, ragi, etc., and in terms of cobs in the case of jowar, bajra and maize, threshing being done after a fortnight of harvesting. Experiments are also conducted in a sub-sample to ascertain the loss due to driage. For this purpose, the cob grains from the experimental plots are required to be stored, exposed to the sun for about two weeks and dry weight recorded (in the case of jowar, bajra and maize, the dried cobs are threshed and grain separated for weighment) when the weight of the produce becomes constant.

The field work of the survey is entrusted to the staff of department of revenue (and agriculture) under the control of the respective State departments.

Method of estimation of yield rate and production. Tabulation of the data is carried out in each State in the office of the State statistician responsible for directing the work of the crop cutting experiments. For each stratum, a simple arithmetic mean of the net yield of sample plots is obtained. For this, the plot yields from the mixed sown fields are divided by the corresponding eye-estimates of the proportion of area under the crop in the field and added to the yields of

all the plots sown with the pure crop to obtain an estimate of the stratum average. The district average is obtained by weighting the stratum average in proportion to the net area under the crop in different strata. The state average is obtained by combining the district averages in proportion to the net area under the crop in the districts. The averages are corrected for draige, the estimates of which are obtained from the results of draige experiments.

The above is the method of estimation followed in general though in some States, it is somewhat different. Thus in Uttar Pradesh, strata averages are obtained separately for the pure and mixed categories of crops (without dividing the actual plot yields of the fields sown with mixtures by the eye-estimates of the proportionate area under the crop) and these are multiplied by the corresponding gross areas (under the pure and different categories of mixed crops) added up and then divided by the estimated net area under the crop to give the district estimate of the net average yield. Netting of areas at district/State level is done by the State land records departments on the basis of ratios regarded as established in practice.

No formula of moderation or adjustment is applied to State yield rate or production obtained on the basis of above calculations except that a reduction of about 2 to 3 per cent is made on account of area under bunds for estimates of rice in some States.

Estimate of production. Estimate of production (metric tonnes) of a given crop in a district is given by

$$d \times 0.0002 \sum_{i=1}^t A_i \left\{ \frac{\sum_{j=1}^{n_i} \sum_{k=1}^{m_{ij}} (x_{ijk}/p_{ijk})}{\sum_{j=1}^{n_i} m_{ij}} \right\}$$

where x_{ijk} = plot yield in grams (plot size 10 m × 5 m) of the crop in the k th field of j th village in the i th stratum.

p_{ijk} = the proportion of area under the experimental crop in the corresponding field in the case of mixed sown crop,

m_{ij} = number of sample fields in the j th village of the i th stratum,

n_i = number of sample villages in the i th stratum,

A_i = net area under the crop in i th stratum (equal to area under the pure crop plus area under the crop as apportioned from the field sown with the crop in mixture with other crops, apportionment being carried out at the field level in some states and at district level in others on the basis of eye-estimate and conventional ratios respectively).

·0002 = conversion factor to obtain outturn in metric tonnes.

d = the driage factor.

t = number of strata in district (a tehsil generally being a stratum).

This is the general expression for the outturn of a crop in a State covering mixture crops also, the value of p_{ijk} being 1 in case the crop is sown pure. For mixture crops, the proportion of area under the experimental crop (p_{ijk}) is estimated by the field staff from the sample field by eye appraisal.

The driage factors are applied to the estimates of green yield generally at the district/State level. The green weight is the 'weight of the grain obtained after threshing the produce (weight of the cobs in the case of jowar, bajra and maize) on the harvesting day. The allowance for driage is determined on the basis of a sub-sample of plots and is estimated from the results of the reweightment of the sample yields after about a fortnight. In the case of jowar, bajra and maize, however, the cobs are threshed after they become dry to obtain the grain and the ratio of the weight of the grain to the weight of green cobs is taken as the driage factor.

Source : Report of the Technical Committee on Crop Estimation.

APPENDIX 7

DESIGN OF NON-NSS CROP ESTIMATION SURVEYS IN KERALA, ORISSA AND WEST BENGAL

1. *Kerala*

THE DESIGN adopted for crop estimation surveys in Kerala is one of stratified multi-stage sampling with talukas as strata, villages as primary unit for sample and field as secondary units with a square plot of size $16\frac{1}{2}' \times 16\frac{1}{2}'$ as ultimate unit. Till 1958-59, villages were allocated to each taluka roughly in proportion to the extent of paddy cultivation. Villages were selected by simple random and from each village 5 fields were selected.

From 1958-59, the method of location of villages among talukas and the procedure for selection of fields have been revised. The number of villages allotted to each taluka is 6 and a systematic sample of 5 paddy fields is chosen from each sample village. If a field has more than one bunded portion (kandom), one of the bunded portions is selected with probability proportion to area.

These have also undergone slight revisions since 1964-65. Six villages are selected in each taluka with probability proportion to size, size being defined by the extent of wet land area. In each village, 3 fields growing the crop are selected.

The size of the ultimate unit is $1/160$ th of an acre ($16\frac{1}{2}' \times 16\frac{1}{2}'$).

Normally a total of 1,400 experiments are planned during each of autumn and winter seasons and about half the number during the summer season.

2. *Orissa*

The design adopted for crop estimation surveys in Orissa is one of stratified two-stage random sample. The whole State is divided into number of strata consisting of groups of contiguous police stations on the consideration of the geographical area, cultivated area and geographical features. The strata are so formed to lie within the district

concerned, From each stratum, a sample of 20 villages is selected with probability proportion to area and with replacement. Out of these 20 villages, a sub-sample of 10 villages is drawn up for yield estimation. In each selected village, 6 clusters of 10 survey numbers are selected for systematic sampling with a random start for land utilization survey.

In each of the 10 crop-cutting villages 2 (or 3) crop-cutting experiments are planned for yield estimation. The clusters remain common for land utilization survey in both the sub-rounds (autumn and winter), whereas the plots for crop-cutting experiments are selected afresh during each season. The ultimate unit for crop cutting is a circle of radius 4' randomly located in each field.

A total of 3,600 villages, constituting 7 per cent of the total number of villages in the State, is selected for land utilization. Out of these, in 1,800 villages crop cutting experiments are organized in 3,630 plots on autumn rice and 5,100 for winter rice.

3. *West Bengal*

The following gives a brief description of the design adopted for crop estimation surveys in West Bengal.

The ultimate sampling unit for land utilization survey is a grid of square size, with an area of 2.25 acres. Sample grids are distributed over each police station at a density of one per half a square mile of area to be surveyed. These are drawn systematically from all the police stations arranged serially. The first mouza in each police station from which sample will be taken is selected at random from the list of Mouza Maps of the particular police station; care being taken to include the entire list of mouzas in a cyclic order. For the purposes of locating samples, cumulative totals of mouza areas are prepared commencing from the first mouza selected as mentioned above.

Samples are selected for locating mouza maps by using random co-ordinates.

Squares representing the size of 2.25 acres are stamped on the maps with one corner falling on the point chosen by the random co-ordinates, the corner to be chosen in an order prescribed for the purpose. All the plots included in the square of area 2.25 acres, either wholly or partially, are listed in a prescribed form.

All samples are divided into two equal parts, designated a- 'Sub-

sample A' and 'Sub-sample B,' the totality of all alternate grids constituting a sub-sample. Grids are chosen afresh every year.

For purposes of crop-cutting experiments, 30 grids are selected at random in each police station. The primary worker will take note of the grids and plots in regard to availability of crops for which crop-cutting experiments are to be carried out. No more than one cut in respect of any particular crop is taken in any one grid, but if more than one crop is under experimentation, as many cuts as the number of experimental crops, are taken from each grid. The number of cuts entrusted to any primary worker is of the order of 30 during a season.

The following is the size of the ultimate cut for different crops :

<i>Serial No.</i>	<i>Crops</i>	<i>Size of ultimate cut</i>
(i)	Jute	} circular area 100 sq. ft. i.e. a circle of radius 5'-6" which is further divided into concentric circles of radii 2' and 4' respectively.
(ii)	Autumn paddy	
(iii)	Winter paddy	
(iv)	All rabi crops excepting the one mentioned below.	
(v)	Potato	} two cuts of the following sizes :
(vi)	Arhar	
vii)	Sugarcane	
		(i) 15' x 15'
		(ii) 5 lines x 15'

Sources : Report of the Technical Committee on Crop Estimates.

APPENDIX 8(a)
PRIMARY FIELD AGENCY IN THE OFFICIAL SERIES OF CROP
ESTIMATION SURVEYS—FOOD CROPS

<i>State</i>	<i>Crops</i>	<i>Primary field agency</i>
(1)	(2)	(3)
1. Andhra Pradesh	rice	Agricultural Extension Officers.
	jawar, maize, rape & tur	Revenue Inspectors.
	bajra	Progress Assts/Taluk Stat. Assts.
2. Assam	all crops	Special staff (Directorate of Statistics).
3. Bihar	maize	Amins and Field Investigator (Dept. of Statistics) Circle Inspectors (Revenue) and Junior Statistical Supervisors (Community Development).
	onion & potato	Amins and Field Investigators (Dept. of Statistics).
	other crops	Circle Inspectors (Revenue).
4. Gujarat	all crops	Gram Sevaks/Panchayat Circle Inspectors/Revenue Circle Inspectors/Revenue Circle Officers.
5. J. & K.	all crops	Girdawar Kanungos.
6. Kerala	rice	Investigators (Department of Statistics).
7. Madhya Pradesh	all crops	Revenue Inspectors.
8. Madras	rice	Agricultural Demonstrators.
	other crops	Revenue Inspectors.
9. Maharashtra	all crops	Circle Inspectors/Circle Officers/Revenue Inspectors/V.L.Ws.

NOTE: In Kanya Kumari district of Madras State, experiments of paddy are entrusted to State Statistical staff.

(1)	(2)	(3)
10. Mysore	all crops	Revenue Inspectors and Agricultural Inspectors.
11. Orissa	rice	Amin of the Bureau of Statistics and Economics.
12. Punjab	all crops	Selection of fields by Patwaris and actual conduct of experiments by Agri. Extension Officers, Compost Inspectors.
13. Rajasthan	all crops	Land Records Inspectors.
14. U.P.	urd, mung and masur all other crops	Agri. Deve. Officers (Agri), Supervisor Kanungos (Revenue Dept.)
15. W. Bengal	all crops	Assistant Investigators of the State Statistical Bureau.
16. Delhi	all crops	V.L.Ws.
17. H.P.	all crops	Girdawar Kanungos.

APPENDIX 3(b)

PRIMARY FIELD AGENCY IN THE OFFICIAL SERIES OF CROP
ESTIMATION SURVEYS—NON-FOOD CROPS

<i>State</i>	<i>Crops</i>	<i>Primary field agency</i>
(1)	(2)	(3)
1. A.P.	sugarcane, cotton, tobacco & castor.	Agricultural Extension Officers.
	g. nut, sesamum & castor	Progress Assts./Taluk Stat. Assts.
2. Assam	all crops	Field Assistants of the Department of Economics and Statistics.
3. Bihar	jute, sugarcane & mesta	Amins & Junior Field Investigators (Deptt. of Statistics), Junior Statistical Supervisors (Community Development), Circle Inspectors (Revenue).
4. Gujarat	all crops	Gram sevaks/Panchayat Circle Inspectors, Revenue Circle Inspectors/Revenue Circle Officers.
5. M.P.	all crops	Revenue Inspectors.
6. Madras	all crops	Agricultural staff
7. Maharashtra	all crops	Circle Inspectors/Circle Officers/Revenue Inspectors/V.L.Ws.
8. Mysore	cotton and sugarcane	Special Agricultural Inspectors.
	oilseeds	Revenue and Agricultural Inspectors.
9. Orissa	jute	Jute Development Staff.
10. Punjab	all crops	Selection of fields by Patwaris and actual conduct of expts. by Agr. Extension Officers, Compost Inspectors.
11. Rajasthan	all crops	Land Records Inspectors.

(1)	(2)	(3)
12. U.P.	cotton jute oilseeds sugarcane	Cotton Supervisors. Jute Development Staff, Supervisor Kanungos (Revenue) Cane Development staff for factory areas and Supervisor Kanungos (Revenue) for other areas.
13. W. Bengal	all crops	Assistant Investigators of the State Statistical Bureau.

APPENDIX 9 (contd.)
 AREA, PRODUCTION AND AVERAGE YIELD PER HECTARE OF PRINCIPAL CROPS—
 ALL-INDIA

A—Area in Thousand hectares
 P—Production in Thousand tonnes
 Y—Yield per hectare in kgs.

	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	

FOOD CROPS—contd.

I. FOODGRAINS

N.A.	N.A.	N.A.	N.A.	14,559	14,569	14,885	15,215	15,448	15,728	16,250
N.A.	N.A.	N.A.	N.A.	12,401	14,059	14,636	11,897	13,168	16,048	15,390
N.A.	N.A.	N.A.	N.A.	852	965	983	782	852	1,020	947
N.A.	N.A.	N.A.	N.A.	20,440	20,807	20,907	19,101	18,485	19,185	19,037
N.A.	N.A.	N.A.	N.A.	19,939	22,116	23,752	17,611	16,454	19,265	21,767
N.A.	N.A.	N.A.	N.A.	975	1,073	1,136	922	836	1,004	1,141
N.A.	N.A.	N.A.	N.A.	696	633	670	957	1,318	1,524	1,660
N.A.	N.A.	N.A.	N.A.	877	823	920	1,147	1,816	2,299	2,634
N.A.	N.A.	N.A.	N.A.	1,260	1,299	1,374	1,198	1,378	1,508	1,586

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Total Rice</i>										
A	30,519		30,810	29,830	29,969	31,289	30,764	31,521	32,277	32,298
P	23,542		20,576	21,300	23,899	28,214	25,219	27,657	29,037	25,625
Y	771		668	714	764	902	820	874	900	790
<i>Jowar-Kharif</i>										
A	N.A.		N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
P	N.A.		N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Y	N.A.		N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
<i>Rabi</i>										
A	N.A.		N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
P	N.A.		N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Y	N.A.		N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
<i>Total Jowar</i>										
A	15,513		15,571	15,944	17,539	17,758	17,464	17,362	16,237	17,311
P	5,870		5,495	6,077	7,350	8,082	9,201	6,726	7,327	8,635
Y	378		353	331	420	455	527	387	451	499
<i>Bajra</i>										
A	9,259		9,023	9,519	10,769	12,199	11,366	11,338	11,251	11,169
P	2,835		2,595	2,346	3,192	4,547	3,519	3,428	2,873	3,620
Y	306		288	246	296	373	310	302	255	324

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
33,172	33,820	34,128	34,694	35,095	35,809	36,462	35,273	35,251	36,437	36,967
30,847	31,676	34,674	35,663	33,217	36,998	39,308	30,655	30,438	37,612	39,761
830	937	1,013	1,023	931	1,033	1,078	869	863	1,832	1,076
N.A.	N.A.	N.A.	N.A.	11,343	11,223	11,251	10,728	11,284	11,889	11,377
N.A.	N.A.	N.A.	N.A.	6,516	5,685	6,297	4,783	5,329	6,735	6,207
N.A.	N.A.	N.A.	N.A.	574	507	557	446	472	576	545
N.A.	N.A.	N.A.	N.A.	7,071	7,153	6,805	6,776	6,770	6,734	7,354
N.A.	N.A.	N.A.	N.A.	3,232	3,513	3,416	2,744	3,895	3,313	3,597
N.A.	N.A.	N.A.	N.A.	457	491	502	405	575	492	489
17,960	17,707	18,412	18,249	18,414	18,376	18,056	17,504	18,054	18,423	18,731
9,083	9,579	9,814	8,029	9,748	9,198	9,683	7,527	9,224	10,048	9,804
503	484	533	440	529	501	536	430	511	545	523
11,428	10,695	11,469	11,278	10,962	11,103	11,827	11,563	12,239	12,808	12,052
3,868	3,493	3,283	3,645	3,959	3,878	4,519	3,655	4,468	5,185	3,802
338	327	266	323	361	349	382	316	365	405	315

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Maize</i>									
A	3,202	3,159	3,310	3,605	3,869	3,749	3,696	3,768	4,079
P	2,046	1,729	2,076	2,870	3,039	2,975	2,602	3,078	3,160
Y	627	647	627	796	785	794	704	819	772
<i>Ragi</i>									
A	2,206	2,203	2,189	2,243	2,334	2,298	2,307	2,279	2,416
P	1,544	1,429	1,312	1,337	1,876	1,653	1,846	1,798	1,796
Y	700	649	599	596	804	719	800	787	743
<i>Small Millets</i>									
A	5,415	4,605	4,764	5,044	5,677	5,030	5,335	4,976	4,870
P	2,278	1,750	1,915	1,926	2,477	2,495	2,070	1,980	1,733
Y	421	380	402	382	436	443	388	388	356
<i>Total Kharif Cereals</i>									
A	66,174	65,371	65,556	69,169	73,126	71,271	71,559	70,778	72,143
P	38,115	33,674	35,096	39,583	48,235	45,062	44,229	46,038	44,459
Y	576	514	534	572	680	632	618	651	616

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
4,265	4,344	4,407	4,507	4,643	4,682	4,618	4,765	5,074	5,583	5,716
3,483	4,073	4,080	4,312	4,607	4,561	4,664	4,760	4,894	6,270	5,701
812	938	926	957	992	995	1,010	999	964	1,123	997
2,540	2,518	2,515	2,511	2,484	2,471	2,612	2,266	2,316	2,291	2,238
1,950	1,986	1,838	2,030	2,041	2,021	2,023	1,176	1,631	1,884	1,640
768	789	731	808	822	818	774	521	704	822	736
5,159	5,148	4,955	4,863	4,772	4,621	4,558	4,444	4,584	4,857	4,746
2,179	2,025	1,909	2,060	1,855	2,022	1,964	1,656	1,488	1,907	1,804
422	393	385	421	389	438	431	373	325	393	380
74,524	74,232	75,886	76,107	76,970	76,962	78,133	75,805	77,518	80,399	80,450
51,340	51,832	55,493	55,729	55,427	58,678	62,161	49,429	52,143	62,906	62,520
689	698	731	732	720	762	796	652	673	782	777

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Wheat</i>									
A	9,758	9,746	9,471	9,828	10,681	11,259	12,307	13,524	11,780
P	6,391	6,462	6,183	7,501	8,017	9,043	8,760	9,403	7,998
Y	655	663	653	763	750	803	708	695	682
<i>Barley</i>									
A	3,181	3,113	3,159	3,246	3,529	3,414	3,418	3,518	3,069
P	2,251	2,378	2,367	2,928	2,951	2,980	2,816	2,863	2,262
Y	708	764	749	902	836	873	824	814	747
<i>Total Rabi Cereals</i>									
A	12,939	12,859	12,630	13,074	14,210	14,673	15,735	17,042	14,799
P	8,642	8,840	8,550	10,429	10,968	12,023	11,576	12,266	10,290
Y	668	687	677	798	772	819	733	720	695
<i>Total Cereals</i>									
A	79,113	79,280	78,186	82,243	87,336	85,944	87,344	87,820	86,942
P	46,767	42,414	43,573	50,012	59,203	57,085	55,805	58,304	54,749
Y	591	542	557	608	678	664	639	664	630

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
12,617	13,380	12,927	13,570	13,590	13,499	13,422	12,658	12,838	14,998	15,968
9,958	10,324	10,997	12,072	10,776	9,853	12,237	10,424	11,393	16,540	18,651
789	772	851	890	763	730	913	824	887	1,103	1,169
3,312	3,378	3,205	3,312	3,019	2,774	2,682	2,633	2,825	3,375	2,768
2,694	2,717	2,819	3,150	2,420	2,038	2,521	2,377	2,348	3,504	2,424
813	804	879	951	802	735	940	903	831	1,083	879
15,929	16,758	16,132	16,882	16,609	16,273	16,104	15,289	15,663	18,373	18,716
12,652	13,041	13,816	15,222	13,196	11,891	14,778	12,801	13,741	20,044	21,075
794	778	856	902	795	731	918	837	877	1,091	1,126
90,453	90,990	92,018	92,989	93,579	93,235	94,237	91,094	93,181	98,772	99,166
63,992	65,873	69,314	70,951	68,623	70,569	76,939	62,230	65,884	82,950	83,595
707	713	753	763	733	757	816	683	707	840	843

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Gram</i>										
A	8,295	7,570	6,830	7,255	7,968	9,248	9,779	9,674	9,091	
P	3,726	3,651	3,387	4,208	4,832	5,631	5,418	6,231	4,890	
Y	449	482	496	550	606	608	554	644	538	
<i>Tur</i>										
A	2,250	2,181	2,446	2,400	2,404	2,404	2,237	2,293	2,361	
P	1,016	1,719	1,830	1,702	1,864	1,719	1,861	1,989	1,473	
Y	452	788	748	709	775	715	814	867	625	
<i>Other Pulses</i>										
A	9,622	9,340	9,499	10,189	11,357	10,262	11,150	11,349	11,086	
P	3,417	3,041	3,703	3,279	3,322	3,610	3,766	3,331	3,197	
Y	355	326	337	322	345	352	338	294	286	
<i>Total Pulses</i>										
A	20,167	19,091	18,775	19,845	21,729	21,914	23,216	23,316	22,538	
P	8,159	8,411	8,420	9,189	10,918	10,950	11,045	11,551	9,562	
Y	405	441	448	463	489	500	476	495	424	
<i>Total Foodgrains</i>										
A	99,230	97,321	96,961	102,088	109,065	107,898	110,560	111,136	109,480	
P	54,916	50,525	51,996	59,201	69,821	63,035	66,850	69,855	64,311	
Y	553	522	536	580	640	631	605	629	587	

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
10,090	10,326	9,276	9,566	9,193	9,354	8,870	7,993	8,003	8,257	7,105
7,023	5,918	6,250	5,785	5,382	4,602	5,777	4,206	3,622	5,971	4,309
697	544	674	606	683	481	651	526	453	723	607
2,473	2,429	2,433	2,447	2,452	2,517	2,578	2,483	2,521	2,665	2,599
1,702	1,701	2,066	1,367	1,582	1,380	1,890	1,736	1,130	1,741	1,816
688	700	849	559	645	549	733	699	448	653	718
11,758	12,078	11,854	12,230	12,620	12,315	12,427	11,804	11,597	11,727	11,630
4,424	4,480	4,368	4,603	4,684	4,391	4,760	3,558	3,595	4,390	4,293
376	371	370	376	363	340	382	332	310	374	369
24,311	24,833	23,563	24,243	24,265	24,186	23,875	22,080	22,121	22,649	21,264
13,149	11,799	12,704	11,755	11,528	10,073	12,417	9,800	8,347	12,102	10,418
541	460	539	485	475	416	520	444	377	534	490
114,764	115,823	115,581	117,232	117,844	117,421	118,112	113,174	115,302	121,421	120,430
77,141	76,672	82,018	82,706	80,151	80,642	89,356	72,030	74,231	95,052	91,013
672	662	710	706	680	637	757	636	644	783	781

II. OILSEEDS									
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Groundnut</i>									
A	3,979	4,494	4,917	4,795	4,247	5,541	5,133	5,532	6,420
P	3,433	3,481	3,192	2,929	3,445	4,245	3,862	4,369	4,710
Y	863	775	649	611	811	766	752	783	734
<i>Castorseed</i>									
A	590	555	582	536	545	555	574	569	447
P	130	103	108	104	105	124	125	124	89
Y	220	186	186	194	193	223	218	218	199
<i>Sesamum</i>									
A	2,046	2,204	2,405	2,337	2,570	2,626	2,293	2,172	2,094
P	438	445	452	471	563	603	467	438	359
Y	214	202	188	198	219	230	204	202	171
<i>Rapeseed & Mustard</i>									
A	1,935	2,071	2,401	2,105	2,244	2,439	2,556	2,539	2,412
P	806	762	943	868	872	1,037	890	1,043	933
Y	417	368	393	408	389	425	386	411	387

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
6,251	6,442	6,463	6,880	7,283	6,886	7,376	7,428	7,299	7,535	7,091
6,178	4,562	4,812	4,994	5,064	5,298	6,004	4,230	4,411	5,731	4,476
328	708	745	725	695	799	814	570	604	759	631
458	492	466	486	469	484	441	409	401	439	334
112	115	107	109	99	102	107	80	110	121	111
245	234	230	224	212	211	242	195	274	276	290
2,250	2,136	2,189	2,252	2,552	2,412	2,486	2,480	2,794	2,654	2,410
514	370	318	373	492	439	484	425	416	445	415
228	173	147	165	193	182	195	171	149	168	172
2,447	2,910	2,883	3,168	3,127	3,046	2,910	2,884	3,006	3,244	2,992
1,042	1,063	1,347	1,346	1,303	915	1,474	1,276	1,228	1,568	1,572
426	365	467	425	417	200	507	442	408	483	525

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(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
1,595	1,974	1,789	1,977	1,904	1,995	2,042	1,727	1,495	1,777	1,708
432	446	398	463	430	379	494	335	260	438	352
283	226	222	234	226	190	242	194	174	247	206
13,001	13,954	13,770	14,772	15,395	14,823	15,255	14,928	14,995	15,467	14,585
7,298	6,556	6,982	7,284	7,388	7,133	8,563	6,346	6,426	8,305	6,926
561	470	507	493	482	481	501	425	428	530	475
7,964	7,295	7,610	7,978	7,730	8,221	8,365	7,942	7,836	7,985	7,685
1,623	1,223	1,865	1,614	1,842	1,912	1,912	1,983	1,808	1,947	1,895
204	168	245	202	238	233	229	212	230	246	247
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	480	478	513	492
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	68	72	73	79
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	149	151	152	161
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	487	495	473	468	488
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	87	92	79	88	89
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	189	175	166	209	205

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
III. FIBRES									
<i>Cotton (Lint)</i>									
A	4,926	5,832	6,556	6,359	6,987	7,546	8,086	8,019	8,014
P	2,568	2,875	3,094	3,155	3,886	4,198	3,949	4,680	4,016
Y	95	88	85	89	100	100	88	104	105
<i>Jute</i>									
A	471	571	790	734	497	503	704	772	705
P	3,114	3,209	4,715	4,629	3,116	2,952	4,232	4,323	4,015
Y	1,190	1,074	1,074	1,135	1,129	1,056	1,032	1,008	1,025
<i>Mesta</i>									
A	N.A.	N.A.	N.A.	196	187	177	231	297	310
P	N.A.	N.A.	N.A.	687	655	908	1,162	1,482	1,312
Y	N.A.	N.A.	N.A.	631	630	923	906	895	762
<i>Sann hemp (fibre)</i>									
A	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	187
P	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	63
Y	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	337
IV. OTHER FORECAST CROPS									
<i>Potato</i>									
A	924	940	250	255	257	266	280	295	321
P	1,543	1,660	1,712	1,992	1,956	1,764	1,859	1,794	2,004
Y	6,594	6,917	6,848	7,312	7,611	6,632	6,639	6,023	6,243

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(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
7,964	7,295	7,810	7,978	7,730	8,221	8,365	7,942	7,836	7,995	7,885
4,608	3,472	5,293	4,581	5,228	5,458	5,677	4,782	4,973	6,454	5,270
104	86	125	103	122	119	122	108	114	123	123
753	682	629	917	847	869	845	757	797	880	529
5,199	4,534	4,134	6,358	5,442	6,079	6,084	4,471	5,358	6,320	3,062
1,277	1,197	1,183	1,248	1,156	1,280	1,292	1,064	1,210	1,293	1,039
397	298	274	425	395	451	368	339	322	321	277
1,712	1,132	1,129	1,878	1,743	1,897	1,598	1,285	1,221	1,272	907
840	708	742	795	795	850	782	683	683	715	590
221	203	182	204	217	204	196	169	180	174	173
82	78	73	78	79	76	80	57	57	71	66
371	384	401	382	361	370	409	335	319	410	381
338	262	375	365	413	415	429	480	473	501	537
2,848	2,723	2,719	2,447	3,363	2,593	3,605	4,060	3,522	4,232	4,773
6,947	7,550	7,251	6,704	8,152	6,249	8,395	8,455	7,440	8,441	8,891

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Sugarcane (gur)</i>									
A	1,467	1,707	1,939	1,729	1,410	1,618	1,847	2,050	2,073
P	5,017	5,703	6,163	5,100	4,494	5,875	6,075	6,957	7,132
Y	3,420	3,342	3,178	2,950	3,187	3,631	3,289	3,394	3,450
<i>Sugarcane (cane)</i>									
P	50,173	57,051	61,634	50,996	44,411	58,739	60,543	69,051	71,155
Y	34,201	33,422	31,786	29,495	31,497	36,303	32,779	33,683	34,325
<i>Black Pepper</i>									
A	79	80	82	82	84	86	89	89	93
P	21	21	23	23	24	26	28	27	27
Y	266	263	280	280	286	302	315	303	290
<i>Chillies (Dry)</i>									
A	514	592	560	500	541	640	604	601	629
P	284	251	247	288	308	387	361	335	357
Y	572	593	620	576	569	605	598	591	568
<i>Ginger (Dry)</i>									
A	23	17	19	19	13	15	16	16	17
P	24	15	15	19	14	14	16	15	16
Y	1,043	882	789	1,000	1,077	933	1,000	938	941
<i>Turneric</i>									
A	47	55	55	42	47	51	49	57	48
P	130	132	145	103	113	132	149	163	127
Y	2,766	2,704	2,638	2,452	2,404	2,688	3,041	2,860	2,646

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
1,948	2,137	2,415	2,455	2,242	2,249	2,603	2,780	2,301	2,047	2,481
7,336	7,947	11,141	10,563	9,286	10,524	12,487	12,100	9,501	8,786	12,003
3,766	3,719	4,619	4,303	4,142	4,681	4,798	4,363	4,123	4,782	4,878
73,358	77,817	110,001	103,967	91,913	104,225	121,909	119,642	92,826	95,500	117,572
37,658	36,414	45,549	42,340	40,996	46,353	46,838	43,041	40,336	46,685	47,786
93	94	103	103	102	102	103	102	102	102	101
26	26	28	28	26	24	24	23	23	22	21
280	277	272	272	256	235	236	228	225	217	212
567	605	667	616	637	748	716	652	721	788	676
333	359	419	389	425	490	475	383	418	591	419
587	593	628	631	667	654	663	589	580	636	620
15	18	19	21	21	23	23	22	23	21	21
14	16	18	19	20	21	21	21	20	20	19
933	839	947	905	920	938	933	936	940	921	933
42	40	40	48	55	59	70	67	58	54	59
104	92	93	86	105	116	146	128	111	109	119
2,476	2,300	2,325	1,792	1,909	1,973	2,995	1,910	1,904	2,020	2,016

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
379	408	401	418	405	441	406	372	424	24	412
317	292	307	339	341	360	356	298	353	369	347
836	716	766	811	842	817	876	800	834	871	842
690	715	717	723	798	798	848	866	893	922	N.A.
4,589	4,734	4,639	4,478	5,017	4,725	5,043	4,999	5,192	5,319	N.A.
6,651	6,621	6,470	6,194	6,298	5,920	5,950	5,775	5,814	5,769	N.A.
N.A.	N.A.	N.A.	N.A.	N.A.	1,218	1,392	1,296	1,596	1,426	N.A.
N.A.	N.A.	N.A.	N.A.	N.A.	456	555	314	443	595	N.A.
N.A.	N.A.	N.A.	N.A.	N.A.	374	402	242	278	417	N.A.
156	764	163	165	181	193	198	204	209	206	N.A.
2,098	2,181	2,212	2,257	2,425	2,601	2,684	2,136	3,412	3,155	N.A.
13,436	13,299	13,571	13,679	13,407	13,504	13,563	15,385	16,310	15,351	N.A.
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	131	138	142	147	N.A.
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	113	120	130	134	N.A.
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	711	750	743	N.A.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
MINOR CROPS									
<i>Papaya</i>									
A	6	7	7	5	4	4	5	5	6
P	147	160	175	128	85	110	197	107	224
Y	24,500	22,857	25,000	25,200	21,250	27,500	39,400	39,400	37,333
<i>Sweet Potato</i>									
A	126	156	174	168	172	195	155	155	182
P	774	800	1,206	947	1,355	1,616	1,103	1,167	1,106
Y	6,143	5,128	6,931	5,637	7,378	8,287	7,116	7,465	6,077
<i>Tapioca</i>									
A	242	236	232	239	285	253	242	229	236
P	1,285	1,283	1,243	1,668	2,012	1,808	1,787	1,631	1,714
Y	5,310	5,436	5,440	7,284	7,060	7,146	7,354	7,122	7,263
<i>Indigo</i>									
A	7	6	5	2	2	4	4	2	2
P	...	...	...	...	...	...	...	...	...
Y	...	...	...	...	...	...	...	...	...
<i>Opium</i>									
A	21	28	23	34	22	17	17	24	26
P	0.2	0.6	0.3	0.6	0.4	0.4	0.3	0.5	0.7
Y	10	21	13	18	18	24	18	21	27

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
6 234 39,000	6 199 33,167	6 197 32,833	6 228 38,000	7 232 34,829	7 236 36,066	6 161 27,285	6 161 26,979	8 189 24,378	8 180 23,153	N.A. N.A. N.A.
223 1,014 4,647	201 1,301 6,473	163 1,261 7,736	138 858 6,217	133 880 6,395	130 855 6,894	155 1,098 7,098	176 1,072 6,098	197 1,281 6,499	219 1,559 7,136	N.A. N.A. N.A.
248 1,759 7,093	272 1,949 7,165	274 1,969 7,186	265 1,892 7,140	247 1,757 7,115	244 2,823 11,558	240 3,033 12,619	271 3,467 12,779	290 2,817 13,163	335 4,620 13,503	N.A. N.A. N.A.
3	3 1 ...	4 1 ...	2	2	2	17	3	2	2	N.A. N.A. N.A.
30 0.8 27	42 0.9 21	47 0.9 19	45 1.0 22	26 0.7 27	21 0.6 31	19 0.6 33	12 0.4 36	14 0.5 33	24 0.8 31	35 0.2 33

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PLANTATION CROPS									
<i>Cashewnut</i>									
A	N.A.	N.A.	N.A.	N.A.	N.A.	73	73	74	86
P	N.A.	N.A.	N.A.	N.A.	N.A.	63	82	83	97
Y	N.A.	N.A.	N.A.	N.A.	N.A.	863	1,065	1,122	1,128
<i>Cardamom</i>									
A	N.A.	N.A.	N.A.	N.A.	N.A.	48	50	54	53
P	N.A.	N.A.	N.A.	N.A.	N.A.	2	3	3	3
Y	N.A.	N.A.	N.A.	N.A.	N.A.	42	60	56	57
<i>Lac</i>									
P	43.5	40.0	48.4	43.0	24.4	38.2	44.2	46.4	42.6
<i>Tea</i>									
A	312	314	316	315	314	315	316	316	321
P	265	275	291	296	297	293	285	311	307
Y	849	876	921	971	850	930	902	984	956
<i>Coffee</i>									
A (Total area)	88	91	93	93	93	95	101	94	99
A (Plucked area)	80	83	84	86	78	82	83	84	87
P	21.9	24.6	24.7	21	25.7	26.6	34.4	35.8	40.3
Y	275	298	294	254	350	324	414	428	464

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
96	105	114	118	184	192	196	199	205	210	N.A.
105	115	124	129	140(R)	144(R)	154	158	163	169	N.A.
1,094	1,095	1,088	1,093	780(R)	749(R)	785	791	797	806	N.A.
55	55	56	55	56	57	55	55	75	75	N.A.
3	3	3	3	4	3	4	4	4	4	N.A.
55	55	54	55	62	60	65	68	48	52	N.A.
37.8	43.3	52.8	38.6	41.7	28.7	17.7	23.5	29.7	38.8	29.6
322	331	331	331	333	334	338	343	345	348	351
317	328	321	324	347	346	372	386	376	385	380
984	985	971	1,070	1,043	1,037	1,102	1,072	1,089	1,107	1,081
108	111	114	118	121	124(P)	128(P)	129(C)	128(C)	N.A.	N.A.
91	96	96	100	99	103(P)	111(P)	N.A.	N.A.	N.A.	N.A.
42.2	45.5	43.2	40.4	41.7	44.8(P)	47.1(P)	63.9(C)	78.9(C)	57.6(C)	72.8(C)
462	474	449	405	419	435(P)	426(P)	N.A.	N.A.	N.A.	N.A.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Rubber</i>									
A (Total area)	68	58	60	68	68	69	70	77	89
A (Tapped area)	N.A.	42	42	45	61	64	64	65	64
P	15.4	14.4	14.5	16.3	20.3	19.6	22.5	23.5	21.5
Y	N.A.	342	344	363	330	307	349	362	339

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
115	123	129	139	144	152	154	157	171	182	N.A.
73	71	72	83	82	94	107	111	114(R)	118(R)	N.A.
24.6	24.2	20.4	27.4	31.9	36.4	43.5	50.0	54.8(R)	64.5(R)	71.1(R)
338	340	354	331	389	387	408	450	483	543	N.A.

Notes : (1) Area figures for sugarcane (cane) are the same as for sugarcane (gur).

(2) In the case of cottonseed, area figures are the same as for cotton (lint). Production figures of cottonseed for 1965-66 to 1968-69 are based upon "All-India Final Estimates of Cotton" but for earlier years these have been arrived at from the production figures of cotton (lint) by applying estimated/ratio of cotton (lint) to cottonseed.

(3) Figures of "Total Five Major Oilseeds", include groundnut, castorseed, sesamum, rapeseed and mustard and linseed only.

(4) Among fibre crops, production of cotton (lint), jute and mesta is in thousand bales of 180 kgs each, while that of sunhemp (fibre) is in thousand tonnes.

(5) In the case of Cashewnut and tapioca, figures from 1962-63 and 1963-64 onwards are not comparable with earlier years due to changes in coverage.

(C)—Figures supplied by Coffee Board.

(R)—Figures supplied by Rubber Board.

(P)—Provisional.

APPENDIX 10

ADJUSTED ESTIMATES OF PRODUCTION OF FORECAST CROPS

ANNUAL Estimates of Production of Principal Crops are being published at present in three stages, viz., Final, Partially Revised and Fully Revised. Index Numbers of Agricultural Production are also being published on a regular basis since 1949-50. In addition, a series of Adjusted Estimates of Production of Foodgrains for the years 1949-50 to 1956-57 were also published in August 1960 issue of *Agricultural Situation in India*. The connotation of the terminology used for the different stages of crop estimates and the inter-relation of official production estimates, index numbers and adjusted estimates are explained in detail in the following paragraphs.

Estimates of production of various crops for any year are first given out in the respective All India Final Estimates for which a regular schedule has been laid down. At the time of preparation of these estimates by the State Governments, the work of area enumeration is not complete. All the results of crop-cutting surveys on which the production estimates are based are also not then available. Hence the Final Estimates are really the provisional estimates.

The second stage of publication is the Partially Revised Estimates; these estimates are published along with the Final Estimates of the following year. Even at that stage the work of consolidation of village returns, which are based on land records, and reconciliation of discrepancies, noticed during verification of data by the supervisory agencies, etc., is not complete in some units. It is on account of these reasons that fully revised estimates, which constitute the third and the last stage of publication of Annual Estimates of Production (as also

Area) become available with a time lag of nearly two years from the close of the agricultural year to which the estimates relate.

The fully Revised Estimates are published by the State Governments in their Season and Crop Reports. At the Centre, Fully Revised Estimates are published in a special table in the *Agricultural Situation in India* and in the publication *Estimates of Area and Production of Principal Crops (Summary Tables)*.

It is well known that the Final Estimates of Production of Principal Crops published from year to year are not strictly comparable over time because of changes in coverage and methods of estimation brought about since Independence. While these changes have improved the quality of statistics from year to year, their strict comparability over time has been lost because the improvements were effected by the different States in different years for different crops. However, a comparable time series was needed for trend studies. To provide such a series, all-India index numbers of agricultural production are being prepared after making due allowance for changes in coverage and methods of estimation. Index Numbers of Agricultural Production, as at present prepared, cover 28 principal crops, which account for over 90 per cent of the total cropped area in the country. Since these index numbers are prepared on the basis of the estimates of production, as available at the time of their preparation, they are also subject to the same processes of revision as the estimates. Thus, in the first stage, the index numbers for any particular year are prepared on the basis of the Final Estimates. In the following year index numbers based on Partially Revised Estimates are issued, which is the second stage. In the final stage, index numbers based on Fully Revised Estimates are issued. These index numbers are prepared only once a year and are published in the August (annual) issue of *Agricultural Situation in India*.

While index numbers of agricultural production serve as the basis for trend studies, need has been felt for a comparable series of absolute production figures and for measuring the magnitude of increase in production in physical terms over Plan periods. To meet this need, a series of 'Adjusted' Estimates of Foodgrain Groups in India were prepared for the years 1949-50 to 1956-57, with 1956-57 Fully Revised Estimates as base. These were published in August

1960 issue of *Agricultural Situation in India*. The Adjusted Estimates are worked out backwards in the light of the index numbers of agricultural production. The procedure adopted has been to adjust production figures from year to year with the Fully Revised Production figures for a particular year as base. The practical implications of this procedure are that the adjusted estimates for any year are on the same coverage and methods of estimation as in the base year. The method of adjustment followed for a particular crop would be as under :

$$A_n = \frac{I_n}{I_b} \times P_b$$

where A_n = Adjusted estimate of the production of a particular crop for the n th year.

I_n = Index of production of the crop for the n th year.

I_b = Index of production of the crop for the base year for adjusted estimates.

P_b = Production of the crop for the base year for adjusted estimates.

To take a concrete example, the adjusted estimates of production of rice for 1958-59 can be worked out by multiplying the fully revised figure of production of 1960-61, i.e., 34,574 thousand tonnes by $\frac{127.6}{137.7}$, where 127.6 is the index of production of rice for 1958-59 and 137.7 is the index of production of rice for 1960-61. The Adjusted Estimate of Production of Rice for 1958-59 by this method works out to 32,038 thousand tonnes against the published (Fully Revised) figure of 30,847 thousand tonnes for that year.

When the first series of Adjusted Estimates of Foodgrains Production was prepared, it was decided that such estimates might be published once in five years preferably with the last year of each Plan serving as base, to afford quantitative measurement of the increase in production over the Plan periods. It was also felt that more frequent publication of adjusted estimates might lead to some confusion.

During the Second Five Year Plan considerable progress was made in the adoption of the technique of random sample crop-cutting surveys both for food and non-food crops. Hence a comparable series of adjusted estimates of production for the years 1949-50 to 1960-61 have been prepared with 1960-61, the last year of the Second Plan, as base. (Table on pp. 326-327). The fully revised estimates of production (absolute) for 1960-61 and the index numbers based on these are also published in the August 1965 Issue of the *Agricultural Situation in India*.

Gra m	3,897	3,819	3,437	4,255	4,886	5,685	5,412	6,227	4,902	7,025	5,619	6,250
Tur	1,949	1,789	1,904	1,772	1,939	1,789	1,937	2,070	1,507	1,739	1,702	2,066
Other Pulses	4,175	3,574	3,766	3,785	4,284	4,153	4,338	3,837	3,687	4,438	4,497	4,388
Total Pulses	10,021	9,182	9,107	9,822	11,109	11,632	11,687	12,134	10,096	13,202	11,818	12,704
Total Foodgrains	60,653	54,922	55,508	61,673	72,186	70,606	69,216	72,337	66,504	78,687	76,690	82,018
Groundnut	3,386	3,434	3,149	2,889	3,397	4,180	3,506	4,307	4,656	5,046	4,561	4,812
Sesamum	412	419	425	440	526	556	432	405	353	507	370	318
Repeseed and Mustard	813	769	943	858	872	1,038	860	1,043	983	1,043	1,063	1,347
Linseed	418	367	322	359	372	377	406	377	251	437	446	398
Castorseed	130	105	108	104	105	124	125	124	90	112	115	107
Total Oilseeds	5,159	5,094	4,947	4,650	5,272	6,281	5,629	6,256	6,283	7,145	6,555	6,982
Cotton	2,619	2,899	3,122	3,169	3,976	4,285	4,031	4,746	4,683	4,604	3,468	5,293
Jute	3,299	3,507	4,895	4,903	3,299	3,128	4,480	4,576	4,249	5,236	4,533	4,134
Mesta	669	669	701	691	659	913	1,168	1,481	1,312	1,712	1,162	1,129
Sugarcane (Gur) ²	6,088	6,922	7,476	6,186	5,449	7,066	7,294	8,353	8,408	8,615	9,333	11,196
Tobacco	269	261	210	245	273	255	303	305	240	317	292	307
Potatoes	1,613	1,732	1,787	2,079	2,040	1,840	1,940	1,800	2,037	2,387	2,779	2,719
Chillies (Dry)	294	351	348	288	308	388	361	355	357	334	359	419
Ginger (Dry)	15.1	14.3	14.5	13.6	13.8	14.3	16.0	15.5	15.9	13.8	16.1	17.6
Pepper (Black)	21.1	20.5	22.6	21.7	23.9	26.8	27.9	27.7	27.0	26.8	26.7	28.4

1. In thousand bales of 180 kgs. each.

2. Adjusted on the basis of 1961-62 (Fully Revised) data.

Note : The group and sub-group totals are derived by addition of individual crop figures and are not worked out with the help of corresponding group and sub-group index numbers.

APPENDIX II
PRODUCTION, IMPORTS AND DISTRIBUTION OF
FERTILISERS—1952-53 TO 1968-69

(tonnes)

Year	Nitrogen (N)			Phosphoric acid (P_2O_5) ¹			Potash (K_2O)	
	Pro- duced	Import- ed ²	Distrib- uted ³	Pro- duced	Import- ed	Distrib- uted ⁴	Import- ed ⁴	Distrib- uted ⁵
1952-53	53,067	44,294	57,822*	7,445	—	4,552	3,311	—
1953-54	52,905	19,346	89,287*	13,831	—	8,261	7,490	—
1954-55	68,478	19,984	94,810*	14,345	—	15,027	11,097	—
1955-56	76,859	53,370	107,495*	12,365	—	13,018	10,295	—
1956-57	78,788	56,768	123,054*	17,585	—	15,874	14,791	—
1957-58	81,144	110,100	149,019*	25,785	—	21,922	12,786	—
1958-59	80,766	97,540	171,988*	30,987	—	29,490	22,366	—
1959-60	83,694	142,335	229,326	51,407	3,819	53,930	33,103	21,342
1960-61	111,987	171,926	211,685	53,722	128	53,134	24,845	29,052
1961-62	154,326	142,920	291,536	65,360	645	63,932	30,331	27,982
1962-63	194,194	229,462	360,033	88,300	7,959	81,385	44,276	36,503
1963-64	219,072	197,691	(406,976)	107,836	12,267	(116,674)	64,060	(50,570)
			425,872		—	120,847		51,860
1964-65	243,230	256,517	(434,473)	131,021	12,293	(147,652)	57,176	(70,440)
			492,249		—	148,530		71,640
1965-66	237,889	376,270	(547,363)	118,779	21,766	(132,178)	93,641	(77,746)
			582,588		—	134,075		89,631
1966-67	308,993	574,628	(838,736)	145,678	129,158	(248,602)	143,337	(115,710)
			830,171		—	274,601		133,666
1967-68	402,648	975,897	(1,051,785)†	207,142	370,776	(422,096)†	276,465	(205,578)
			1,135,655†		—	438,168†		205,750
1968-69	562,981	780,062	1,222,398	213,229	90,828	296,140	165,183	164,077
			(1,253,953)		—	(318,351)		(177,567)

Note, (i) The all India figures have been arrived at by converting fertiliser materials into nutrients.

(ii) From 1963-64 onwards bracketed figures are on April-March and others on July-June basis.

1. Excludes data in respect of bonemeal and rockphosphate.
2. Figures from 1952-53 to 1957-58 are on April-March basis.
3. Figures from 1952-53 to 1956-57 relate to calendar years ending in the first half of the period stated while from 1957-58 to 1962-63 they are on April-March basis.
4. Figures from 1952-53 to 1957-58 refer to calendar year ending in the first half of the period stated while from 1958-59 to 1962-63 they are on April-March basis.
5. In the case of potash from 1952-53 to 1958-59, in absence of distribution figures the quantity imported is taken as distributed. Figures relate to financial year April-March.

†Figures incomplete for lack of details of despatches relating to production of 15,662 tonnes of N and 8,546 tonnes of P_2O_5 .

* Allotments of fertilisers under the "Central Fertiliser Pool."

Source : Fertiliser Statistics, the Fertilizer Association of India, 1968-69.

APPENDIX 12
STATEWISE DISTRIBUTION OF N, P₂O₅ AND K₂O
1968-69 (July-June)

(tonnes)				
Distributed to	N	P ₂ O ₅	K ₂ O	Total
South	366,053	79,702	67,418	513,173
Andhra Pradesh	106,924	32,036	4,875	143,835
Kerala	32,085	7,989	24,810	64,884
Mysore	102,577	19,810	12,456	134,843
Tamil Nadu	98,535	19,212	24,766	142,513
Pondicherry	698	79	—	777
U.P.A.S.I.	11,874	252	252	12,378
Coffee Board	10,599	324	259	11,182
Rubber Board	2,339	—	—	2,339
Cardamom Board	422	—	—	422
West	220,007	85,516	29,575	335,098
Gujarat	55,069	33,540	3,493	92,102
Madhya Pradesh	32,444	12,267	3,351	48,062
Maharashtra	131,672	39,584	22,422	193,671
Goa, Daman & Diu	752	111	309	1,172
Dadra & Nagar Haveli	70	14	—	84
North	483,655	75,388	47,394	606,437
Haryana	43,035	1,627	3,058	47,720
Jammu & Kashmir	1,483	149	—	1,632
Punjab	128,845	17,569	4,012	150,426
Rajasthan	25,230	990	1,426	27,646
Uttar Pradesh	279,148	53,849	38,859	371,856
Delhi	2,513	58	39	2,610
Himachal Pradesh	3,401	1,146	—	4,547
East	107,002	15,554	15,461	138,017
Assam	5,959	1,512	1,372	8,843
Bihar	32,613	2,363	3,036	38,012
Orissa	10,034	945	774	11,754
West Bengal	43,818	10,699	10,202	64,719
Manipur	1,774	32	75	1,881
Tripura	273	—	2	275
Nagaland	10	2	—	12
Dandakaranya	18	—	—	18
Tea (N.E. India)	12,503	—	—	12,503
Others	2,877	6,900	4,229	14,006
All-India	1,222,398	296,140	164,077	1,682,615

Note: The difference between 'all India total' and the sum of zonal totals and 'others' is due to the non-availability of the Statewise distribution of 42,804 tonnes of N and 33,080 tonnes of P₂O₅.

Source: Fertiliser Statistics, 1968-69.

APPENDIX 13
LIVESTOCK CENSUS PROFORMA
NUMBER OF LIVESTOCK, POULTRY, AGRICULTURAL IMPLEMENTS &
MACHINERY, FISHING CRAFTS AND TACKLE

(Number)

State/District	LIVESTOCK										
	CATTLE										
	MALES OVER 3 YEARS						FEMALES OVER 3 YEARS				
	Used for breeding only	Used for breeding and work both	Used for work only		Bulls & Bullocks over 3 years not in use for breeding or work	Total males over 3 years	Breeding cows, i.e., cows over 3 years kept for breeding or milk production				
			Cast-rated	Uncast-rated			In milk	Dry	Not calved even once	Total	
1	2	3	4	5	6	7	8	9	10	11	

(Number)

LIVESTOCK										
CATTLE (Contd.)										
State/District	FEMALES OVER 3 YEARS				YOUNG STOCK					
	Cows over 3 years used for work only	Cows over 3 years not in use for work or breeding purposes	Total females over 3 years	Under 1 year			1 to 3 years			
				Male	Female	Total	Male	Female	Total	
1	12	13	14	15	16	17	18	19	20	

State/District	LIVESTOCK CATTLE (Contd.)						(Number)
	YOUNG STOCK (Contd.)			TOTAL CATTLE			
	Total 3 years and under						
	Male	Female	Total	Male	Female	Total	
1	21	22	23	24	25	26	

State/District	(Number)									
	LIVESTOCK									
	BUFFALOES									
	MALES OVER 3 YEARS					FEMALES OVER 3 YEARS				
	Used for breeding only	Used for breeding & work only	Used for work only		Bulls & Bullocks over 3 years not in use for breeding or work	Total males over 3 years	Breeding cows, i.e., cows over 3 years kept for breeding or milk production			
Castrated			Uncastrated	In milk			Dry			
27	28	29	30	31	32	33		34		

State/District	LIVESTOCK						(Number)
	BUFFALOES (Contd.)						
	FEMALES OVER 3 YEARS						
	Breeding cows, i.e., cows over 3 years kept for breeding or milk production (contd.)		Cows over 3 years used for work only	Cows over 3 years not in use for work or breeding purposes	Total female		
	Not calved even once	Total					
I	35	36	37	38	39		

State/District		LIVESTOCK						(Number)
		BUFFALOES (Contd.)						
		UNDER 1 YEAR			1 TO 3 YEARS			
		Male	Female	Total	Male	Female	Total	
1	40	41	42	43	44	45		

State/District	LIVESTOCK						(Number)
	BUFFALOES (Contd.)						
	YOUNG STOCK (Contd.)			TOTAL BUFFALOES			
	Total 3 years & under			Male	Female	Total	
	Male	Female	Total				
1	46	47	48	49	50	51	

LIVESTOCK												(Number)
State/District	YAKS											TOTAL BOVINE
	3 YEARS AND UNDER					ABOVE 3 YEARS					Total yaks	
	Male		Female		Total	Male		Female		Total		
	1	52	53		54	55	56	57	58	59			60	61

		LIVESTOCK						(Number)
		SHEEP						
State/District	UNDER 1 YEAR			1 YEAR AND OVER				
	Male	Female	Total	Male	Female	Total	Total Sheep	
	62	63	64	65	66	67	68	
1								

(Number)										
LIVESTOCK										
GOATS										
State/District	UNDER 1 YEAR			1 YEAR AND OVER						Total Goats
	Male	Female	Total	Male	Female			Total		
					In milk	Dry	Others			
									Total	
	69	70	71	72	73	74	75	77	78	

LIVESTOCK									
HORSES AND PONIES									
State/District	OVER 3 YEARS			YOUNG STOCK					
			Total	Upto 1 Year			1 to 3 Years		
	Male	Female		Male	Female	Total	Male	Female	Total
1	79	80	81	82	83	84	85	86	87

(Number)

State/District	LIVESTOCK											(Number)
	HORSES AND PONIES (Contd.)											
	YOUNG STOCK (Contd.)			Total Horses and Ponies			Mules			Donkeys		
	Total 3 years and under											
	Male	Female	Total	Male	Female	Total	Upto 3 Years	Over 3 Years	Total	Male	Female	Total
I	88	89	90	91	92	93	94	95	96	97	98	99

State/District	(Number)									
	LIVESTOCK							POULTRY		
	CAMELS				PIGS			FOWLS		
	OVER 4 YEARS		4 YEARS AND UNDER		Total		Total Livestock	Cocks		
	Male	Female	Male	Female	Total	Total		Desi	Improved	Total
1	100	101	102	103	104	105	109	110	111	112

POULTRY (Contd.)															(Number)
FOWLS (Contd.)															
State/District	Hens			Chicken			Total Fowls			Ducks				Total	
	Desi	Imp- roved	Total	Desi	Imp- roved	Total	Desi	Imp- roved	Total	Ducks	Drakes	Ducklings	Total	Others	Poultry
	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127

AGRICULTURAL MACHINERY AND IMPLEMENTS												(Number)
State/District	Ploughs		Improved Harrow and culti- vators	Improved seed drills	Improved Threshers	Rotary Chaff cutters	Sprayers and dusters	Carts	Sugarcane crushers		Oil engines with pumps for irrigation purpose	
	Wooden	Iron							Worked by power	Worked by bullocks		
			128	129	130	131	132	133				134
1												

State/District	AGRICULTURAL MACHINERY AND IMPLEMENTS (Contd.)							(Number)
	Electric pump for irrigation purpose	Persian wheels or Rahats	Tractors		2 wheel walk- ing tractors or power tillers	Ghanis		
			Govt.	Private		5 kilograms and more	Less than 5 kilo- grams	
1	120	140	141	142	143	144	145	

State/District	FISHING CRAFTS						(Number)	
	Fishing Boats						Power vessels	
	Catamarans	Dugout canoes	Big size 32 ft. and above	Small size less than 32 ft.	Total		Fishing boats worked by power	Carrier boats worked by power
I	146	147	148	149	150		151	152

FISHING TACKLE											(Number)
State/District	Nets										
	Fixed or Stationary	Bag and Purse	Boat seine	Shore seine	Drift and gill	Scoop	Trawl type	Cast	Others	Total	Remarks
I	153	154	155	156	157	158	159	160	161	162	163

APPENDIX 14
NUMBER OF LIVESTOCK, POULTRY, AGRICULTURAL MACHINERY
AND IMPLEMENTS AND FISHING CRAFTS AND TACKLES IN INDIA
(1961 and 1966)

(Number)

<i>S. No.</i>	<i>Item</i>	<i>1966-Census (Provisional)</i>	<i>1961-Census</i>	<i>Percentage in- crease (+) or decrease (-) of col. (3) over col. (4)</i>
(1)	(2)	(3)	(4)	(5)

1. Cattle

(a) Males over 3 years

(i) Used for breeding only	433	364	(+) 1.1
(ii) Used for breeding and work both	2,251	1,964	
(iii) Used for work only	69,145	68,704	
(iv) Others	1,464	1,496	(-) 2.1
Total	73,293	72,528	(+) 1.1

(b) Females over 3 years

(i) Breeding			
(a) In milk	20,965	20,667	(+) 1.4
(b) Dry	25,797	25,017	(+) 3.1
(c) Not calved even once	4,992	5,319	(-) 6.1
(ii) Working	1,982	2,150	(-) 7.2
(iii) Others	929	1,052	(-) 11.7
Total	54,665	54,204	(+) 0.9
(c) Youngstock	48,028	48,825	(-) 1.6
Total Cattle	175,987	175,557	(+) 0.2

(1)	(2)	(3)	(4)	(5)
2. <i>Buffaloes</i>				
(a) <i>Males over 3 years</i>				
(i) Used for breeding only	330	291		
(ii) Used for breeding and work both	620	493		(+) 6.6
(iii) Used for work only	6,973	6,645		
(iv) Others	269	254		(+) 5.9
Total	8,192	7,684†(R)		(+) 6.6
(b) <i>Females over 3 years</i>				
(i) <i>Breeding</i>				
(a) In milk	12,909	12,463		(+) 3.6
(b) Dry	10,435	9,496		(+) 9.9
(c) Not calved even once	2,148	2,279		(-) 5.8
(ii) Working	385	487		(-) 20.9
(iii) Others	245	297		(-) 17.7
Total	26,122	25,023 (R)‡		(+) 4.4
(c) <i>Youngstock</i>	18,562	18,504		(+) 0.3
<i>Total Buffaloes</i>	52,876	51,210		(+) 3.3
3. <i>Sheep</i>	42,010	40,223		(+) 4.4
4. <i>Goats</i>	64,549	60,864		(+) 6.1
5. <i>Horses and ponies</i>	1,148	1,327		(-) 13.5
6. <i>Pigs</i>	4,973	5,176		(-) 3.9
7. <i>Camels</i>	1,027	908		(+) 13.8
8. <i>Mules</i>	61	53		(+) 16.2
9. <i>Donkeys</i>	1,067	1,096		(-) 2.7
10. <i>Yaks</i>	16	22(R)		(-) 26.1
11. <i>Total Livestock</i>	343,727	336,432		(+) 2.2
12. <i>Poultry</i>				
(a) <i>Hens</i>				
(i) Desi	34,655	34,595	] (P)	(+) 11.0
(ii) Improved	3,736			
(b) <i>Total Fowls</i>				
(i) Desi	91,474	91,518		(-) 0.1
(ii) Improved	8,964	4,278		(+) 109.8
(c) <i>Total Ducks</i>	9,665	6,697		(+) 44.3
(d) <i>Other Poultry</i>	1,176	1,843		(-) 36.2
<i>Total Poultry</i>	115,071 (Q)	114,254 (R)		(+) 0.7

(1)	(2)	(3)	(4)	(5)
13. Agricultural Machinery and Implements				
<i>(a) Ploughs</i>				
(i) Wooden	39,923	38,372	(+)	4.0
(ii) Iron	3,171	2,298	(+)	38.0
(b) Improved harrows and Cultivators	2,691	N.C.		
(c) Improved seed drills	1,122	N.C.		
(d) Improved Threshers	344	N.C.		
(e) Rotary Chaff cutters	3,667	N.C.		
(f) Sprayers and dusters	202	N.C.		
(g) Carts	12,613	12,072	(+)	4.5
<i>(h) Sugar-cane Crushers</i>				
(i) Worked by power	43	33	(+)	29.0
(ii) Worked by bullocks	638	590	(+)	8.0
(i) Oil Engines for irrigation purpose	449	230	(+)	95.1
(j) Electric pumps for irrigation purpose	391	160	(+)	143.8
(k) Persian wheels or rahats	656	600	(+)	9.3
<i>(l) Tractors</i>				
(i) Government	5	4	(+)	30.8
(ii) Private	49*	27	(+)	79.8
(m) Two wheel walking tractors or power tillers	15	N.C.	—	
<i>(n) Ghanis</i>				
(i) 5 kg. and more	74	78	(—)	4.9
(ii) Less than 5 kg.	158	172	(—)	8.2
<i>Fishing Crafts and Tackles</i>				
(a) Fishing boats	196	N.C.		
(b) Fishing and carrier boats worked by power	11	N.C.		
(c) Fishing nets	2,911	N.C.		

N.C.—Not Collected. (Q)—Includes 3,792,352 for which details are not available.

(R)—Includes 9,922,171 for which details are not available.

*—Includes 127 Tractors in respect of Goa, Daman and Diu for which other data on number of livestock etc. are not available.

(P)—Included under Desi.

Notes.—1. Figures published earlier in respect of the State have undergone changes.

2. The figures are tentative and subject to revision.

† Includes 655 for which details are not available.

‡ Includes 560 for which details are not available.

(R)—Revised.

APPENDIX 15

SCHEME FOR THE COLLECTION OF FARM (HARVEST) PRICES

For the sake of uniformity it is desired that the States, so far not collecting the Farm prices, may start doing so.

Farm prices of a commodity may be defined as the average wholesale price at which the commodity is disposed of by the producer to the trader at the village site during the specified harvest period.

The following procedure is suggested for systematizing the collection and compilation of these statistics :

- (i) A certain number of representative villages may be selected in each district at the rate of one, two or three villages from each tehsil, depending upon the extent to which the crop is grown in the Tehsil. The total number of villages to be selected in each district should, however, be not less than ten.
- (ii) In each selected village, the prices at which the commodity is sold by the producer may be recorded in the specified form attached, on every Friday during the harvest time. If no sales take place on that day, the price at which the commodity was sold during the last week may be recorded instead.
- (iii) In case where village site transactions do not take place, the prices reported should relate to what the farmer receives for his produce and should be obtained by subtracting transport and other marketing charges from the wholesale prices quoted at the *mandi* where the produce is disposed of.
- (iv) The price recorded should be the wholesale price of the specified variety in terms of rupees and paises per quintal net weight exclusive of gunny.

The existence of different varieties and qualities with a wide range in price variation makes the task of giving a single harvest price for a commodity for the whole State difficult. In each district, however, it is possible to determine a particular variety which is grown to the largest extent and that variety may be specified for the purpose of quoting the farm price. In some cases, it may be necessary to give the farm prices of two varieties separately if the difference in price is great, as for instance, in the case of prices of American and Deshi Cottons.

It is also necessary to fix the period of harvest for each crop, as it varies widely depending upon the variety of the crop and the nature of cultivation. In some cases it is even difficult to define strictly the harvest period as for instance in the case of cotton where there are more than four pickings in a year. These periods may be fixed in respect of each crop and each state by the state Governments having due regard to the local conditions. Usually in case of most commodities six to eight weeks after the commencement of the harvest may be taken to be the harvest period during which farmers are generally expected to dispose of their produce.

It is proposed that the supervisors, Kanungos, the Revenue Inspectors or the equivalent officials, who are generally employed for the collection of statistics of area and yield may be entrusted with the task of collecting these statistics also. It is also proposed that if circumstances permit, the services of primary teachers may be utilized for this purpose. The reporters should visit the selected villages on the appointed dates, inquire personally the prices of the commodity which has been sold by the cultivator and record these on the specified form.

It is suggested that the farm prices should be collected in respect of all the important crops and in any case they should be given for all the forecast crops. As the final estimate of every crop is published at least one month after the completion of harvesting; it may be feasible to get the farm prices ready by the time of the final estimate, in which case, these prices will also be included in the Final Estimate. Finally publication of these statistics will enhance their value.

The method of striking the average price for the state as a whole should be the method of weighted average, with the district production figures for the current year as weights. The average price for the district for each week may be obtained as the simple arithmetic

average of the tehsil prices, which are in turn the simple arithmetic averages of village prices. The average price for the season is the simple arithmetic average of the district prices for each week.

Farm prices multiplied by the production figures of the different crops will give an estimate of the income of the producers of the commodity which is the same thing as the contribution of that particular commodity to the Agricultural National Income.

APPENDIX 16(a)
ALL-INDIA INDEX NUMBERS OF AREA UNDER CROPS, AGRICULTURAL
PRODUCTION AND PRODUCTIVITY—1949-50 TO 1968-69
Index Number of Area under Crops in India
(Agricultural year 1949-50=100)

Commodity/Group	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58	1958-59
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>I. Foodgrains</i>									
Rice	100.9	97.7	98.2	102.5	100.6	103.1	105.4	105.5	108.3
Jowar	100.2	102.6	112.9	114.3	112.4	111.6	104.3	111.2	116.1
Bajra	97.4	102.8	116.3	121.8	122.8	122.4	121.4	120.5	123.3
Maize	96.4	101.0	110.0	118.0	114.3	112.7	114.6	124.4	130.1
Regi	92.4	91.8	94.0	97.9	96.4	93.2	94.3	100.0	105.1
Small Millets	96.6	99.9	105.5	119.0	118.0	111.6	104.1	101.9	107.5
Kharif Cereals	99.4	99.7	105.2	111.2	108.3	108.5	107.3	109.4	112.9
Wheat	99.9	97.1	100.7	109.5	115.4	126.7	138.6	120.2	129.3
Barley	97.9	99.4	102.1	111.6	107.4	107.5	110.6	96.5	104.1
Rabi Cereals	99.4	97.6	101.0	109.8	113.4	122.0	131.8	114.5	123.2
Cereals	99.4	99.3	104.5	111.0	109.1	110.7	111.4	110.3	114.7
Gram	91.2	82.3	87.4	96.0	111.5	118.0	116.7	109.7	121.6
Tur	93.5	104.9	102.9	103.1	103.1	98.0	98.3	101.2	106.0
Other Pulses	92.2	98.4	105.6	117.7	106.2	115.3	117.4	114.7	121.7
PULSES,	91.9	92.9	97.9	107.1	110.3	116.8	117.3	113.4	122.3
FOODGRAINS	97.9	98.0	103.2	110.2	109.3	111.9	112.5	110.8	116.1

APPENDIX 16(a) (Contd.)
ALL-INDIA INDEX NUMBERS OF AREA UNDER CROPS, AGRICULTURAL
PRODUCTION AND PRODUCTIVITY—1949-50 TO 1968-69
Index Numbers of Area under Crops in India

(Agricultural year 1949-50 = 100)

1959-60	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
110.4	111.4	113.5	116.8	116.7	118.8	114.9	114.8	118.7	120.4
113.8	117.2	118.3	118.3	118.1	116.0	112.5	116.0	118.4	120.4
115.4	123.8	121.6	116.2	119.7	127.5	124.7	132.0	138.1	130.0
132.5	134.4	137.4	141.5	139.7	140.7	146.2	164.6	170.1	174.1
104.2	104.1	103.9	102.8	102.2	108.0	98.3	95.7	94.7	92.5
107.3	103.3	101.5	98.9	96.2	95.1	92.7	95.7	191.4	99.1
112.5	115.0	115.4	116.7	116.5	118.3	114.8	117.4	121.8	121.9
137.1	132.5	139.1	139.3	138.4	137.6	129.7	131.6	153.7	163.5
106.3	100.9	106.2	96.8	88.9	86.0	84.4	90.5	108.1	86.3
129.6	124.6	131.1	129.0	126.4	125.1	118.8	121.7	142.8	145.5
115.4	116.7	118.1	118.8	118.2	119.5	115.5	118.1	125.2	125.7
124.6	111.9	115.4	110.9	112.8	107.0	96.4	96.5	99.6	85.7
104.3	104.8	104.8	105.0	107.7	110.3	106.2	107.8	113.9	108.1
125.0	122.2	126.1	130.1	127.0	128.2	119.7	119.6	120.9	119.9
124.9	118.3	121.7	121.8	121.4	119.8	110.8	111.0	113.6	106.7
117.2	116.9	118.7	119.3	118.8	119.5	114.5	116.6	122.8	121.8

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>II. Non-Foodgrains</i>									
Groundnut	113.0	123.6	120.5	108.8	130.4	129.1	139.2	161.5	157.3
Sesamum	107.7	117.5	116.2	125.6	127.5	111.3	165.4	101.6	109.2
Rapeseed and Mustard	107.0	123.4	108.1	115.2	125.2	131.2	130.3	123.7	125.5
Linseed	92.2	89.8	83.6	90.2	88.5	98.4	108.4	33.5	103.8
Castorseed	94.0	98.1	90.5	91.9	93.6	96.9	96.0	75.5	77.3
OILSEEDS	106.5	115.8	110.7	108.9	123.6	118.3	123.4	125.0	128.4
Cotton	119.2	132.9	128.9	141.7	153.0	164.0	162.7	162.6	161.6
Jute	121.3	167.8	135.9	165.5	106.8	149.4	163.9	149.6	155.6
Mesta	100.0	104.9	103.4	99.0	93.7	122.2	156.2	163.0	193.2
FIBRES	118.8	135.0	130.4	137.3	147.2	160.7	161.8	160.7	161.3
Tea	100.4	100.1	100.4	99.3	101.0	101.3	100.7	102.3	102.6
Coffee	103.6	105.7	107.2	97.6	103.2	104.2	104.7	110.1	120.5
Rubber	83.9	84.7	89.5	122.5	127.3	128.1	129.8	148.8	196.0
PLANTATION CROPS	99.0	99.3	100.4	101.7	104.4	104.9	104.8	109.3	117.4

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
162.1 103.7	162.6 105.3	173.3 109.3	183.1 123.3	173.1 116.5	185.3 120.1	186.6 119.8	183.4 124.9	189.8 128.2	178.2 116.4
149.2 128.5 83.0	147.8 116.5 78.6	162.4 128.7 82.1	160.3 123.9 79.3	156.2 129.8 81.7	149.2 132.9 74.4	147.8 112.4 69.0	154.1 97.3 67.7	166.3 115.6 74.2	153.4 111.1 64.9
137.8	136.0	145.9	151.3	146.2	150.4	147.2	147.9	154.5	143.8
148.0 144.8 154.3	154.4 133.5 144.1	161.9 194.6 223.5	156.9 179.8 207.5	166.8 184.3 211.1	169.7 179.3 193.5	161.1 180.5 178.3	158.9 169.1 169.3	162.1 186.8 168.6	155.8 112.2 145.6
147.2	151.5	165.8	159.6	168.8	170.3	160.7	159.2	163.5	151.0
105.6 123.7 207.2	105.7 129.9 217.5	105.6 131.2 236.0	106.0 130.8 244.3	106.5 135.7 260.1	107.7 145.6 318.3	112.1 144.8 330.6	113.1 143.7 332.9	111.8 143.7* 345.2	115.7 143.7* 345.2*
121.6	123.6	126.7	128.0	132.3	136.3	142.3	142.9	143.0	145.8

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sugarcane	116.4	132.2	117.8	96.0	109.6	125.1	138.9	140.4	132.0
Tobacco	102.7	82.9	104.2	106.1	99.6	117.8	120.4	103.3	108.9
Potatoes	102.4	104.7	108.7	109.8	113.8	119.5	122.2	137.1	144.4
Pepper (black)	100.5	103.0	103.0	106.1	108.1	112.2	112.8	117.8	118.0
Chillies	115.4	109.2	97.4	105.4	124.8	117.8	117.2	122.6	110.6
Ginger	71.4	82.1	95.8	61.5	68.9	74.5	72.6	77.8	69.7
MISCELLANEOUS									
CROPS	112.3	117.8	110.6	100.3	103.9	113.5	121.0	122.1	116.8
NON-FOODGRAINS	110.8	121.3	116.2	115.9	127.4	130.7	134.4	135.2	136.6
ALL COMMODITIES	99.9	101.7	105.3	111.2	112.3	115.0	116.0	114.7	119.4

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
144.8	163.6	166.3	151.9	152.2	176.2	183.2	155.8	133.6	166.7
117.4	115.4	120.2	116.4	126.7	116.9	107.0	121.8	121.8	118.6
154.6	156.2	152.2	172.1	172.7	178.7	199.8	196.9	208.6	223.3
119.2	129.5	129.4	128.8	128.8	129.6	129.1	128.1	128.5	127.5
117.9	129.9	117.5	121.5	142.7	136.6	124.2	137.4	150.1	128.8
180.6	86.5	87.2	90.2	95.7	95.3	92.3	95.7	89.8	87.7
126.7	138.8	138.2	132.7	138.1	148.6	153.0	140.4	134.8	146.1
139.0	141.2	150.7	151.0	151.9	156.3	152.5	150.5	154.5	146.9
120.7	120.8	123.8	124.3	124.0	125.3	120.5	122.0	127.8	125.7

*Based on provisional estimates.

Note. The indices for 1965-66 to 1967-68 are generally based on Partially Revised Estimates, while those for 1968-69 are generally based on Final Estimates. The indices for these years are, therefore, subject to revision.

APPENDIX 16 (b)
Index Number of Agricultural Production in India

Commodity/Group	Weight	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>I. Foodgrains</i>									
Rice	35.3	87.9	90.1	96.8	118.6	105.8	114.2	120.4	105.7
Jowar	5.0	89.8	96.4	106.6	117.0	132.3	96.7	108.3	124.1
Bajra	2.7	83.8	75.8	94.8	135.0	107.8	108.3	90.1	113.5
Maize	2.1	84.4	101.3	123.3	130.2	127.5	112.3	132.3	132.9
Ragi	1.2	87.6	80.4	82.0	115.0	108.6	119.7	118.7	118.6
Small Millets	1.5	88.9	97.4	97.9	125.9	126.8	105.1	98.0	86.7
Kharif Cereals	47.8	87.7	90.4	98.5	120.0	110.4	111.8	116.9	109.2
Wheat	8.5	101.1	92.9	112.7	120.0	135.4	131.3	140.7	118.5
Barley	2.0	105.6	100.0	122.4	123.2	124.4	118.5	120.5	95.9
Rabi Cereals	10.5	102.0	95.1	114.5	120.6	133.3	128.9	136.9	114.2
CEREALS	58.3	90.3	91.2	101.4	120.1	114.5	114.9	120.5	110.1
Gram	3.7	98.0	88.2	109.2	125.4	145.9	138.9	159.8	125.8
Tur	1.1	91.8	97.7	90.9	99.5	91.8	99.4	106.2	77.3
Other Pulses	3.8	85.6	90.2	90.9	102.6	99.6	103.9	91.9	88.3
PULSES	8.6	91.7	90.3	98.8	112.0	118.5	118.4	122.9	103.0
FOODGRAINS	68.9	90.5	91.1	101.1	119.1	115.0	115.3	120.8	109.2

APPENDIX 16(b) (Contd.)
Index Number of Agricultural Production in India

1958-59	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
127.6	130.2	137.7	142.4	132.6	147.0	156.2	131.8	120.9	149.4	157.2
129.8	123.3	141.1	116.4	140.1	132.2	136.2	136.2	132.6	143.5	141.0
121.3	109.5	102.9	114.1	123.9	121.3	141.3	143.3	139.7	132.1	118.9
135.5	146.5	146.7	164.3	164.8	163.2	166.5	168.9	174.7	292.8	198.6
129.1	131.5	121.7	132.0	133.0	131.5	130.8	70.1	105.5	121.9	106.8
112.2	104.2	98.2	105.2	93.3	103.2	100.8	85.0	76.5	98.0	92.7
127.4	125.3	134.8	137.1	133.1	142.9	151.7	119.8	123.8	150.6	151.9
147.4	152.8	162.8	178.8	159.6	145.9	181.5	154.4	168.7	244.9	259.7
112.7	113.7	118.0	135.5	102.6	86.4	106.0	99.9	98.7	147.3	101.7
140.8	145.4	154.3	170.2	146.7	134.6	167.1	144.0	155.4	226.3	228.8
129.0	123.9	138.3	143.1	135.9	141.4	154.5	124.2	129.5	164.2	165.7
150.3	144.2	160.4	148.5	137.6	115.5	148.2	107.9	92.9	153.2	106.1
89.2	87.3	106.0	70.0	79.8	69.6	95.3	87.6	57.0	87.8	88.5
106.3	107.7	105.1	110.2	109.8	100.3	113.4	92.1	85.9	104.9	102.6
136.0	120.8	129.0	121.5	117.9	102.9	126.1	98.3	85.2	123.5	102.3
130.6	127.9	137.1	140.3	133.6	136.5	150.8	120.9	123.8	159.0	157.5

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>II. Non-Foodgrains</i>									
Groundnut	5.7	101.4	93.0	85.3	100.3	123.6	112.4	127.2	137.5
Sesamum	1.2	101.6	103.2	106.9	127.6	135.1	104.8	98.2	85.7
Repseed and									
Mustard	2.0	94.6	118.0	105.5	107.3	127.7	105.8	128.3	114.8
Linseed	0.8	87.8	77.1	86.0	80.1	90.3	97.1	90.3	60.9
Castorseed	0.2	80.5	82.8	76.7	80.5	96.4	96.1	95.3	68.7
OILSEEDS	9.9	98.5	97.4	91.9	103.7	122.6	108.6	120.3	119.0
Cotton	2.8	110.7	119.2	121.0	151.8	163.6	153.9	181.2	178.8
Jute	1.4	106.3	151.4	143.6	100.0	94.8	135.8	138.7	128.8
Meats	0.3	100.0	104.8	103.3	95.5	135.5	174.7	221.5	196.2
FIBRES	4.5	108.6	128.3	128.4	132.1	140.4	149.7	170.7	164.4
Tea	3.3	103.8	109.6	115.4	100.6	110.4	107.2	117.2	115.7
Coffee	0.2	113.3	112.7	125.9	146.5	151.3	196.1	204.1	229.8
Rubber	0.1	93.8	94.4	106.1	131.8	127.6	146.1	152.9	140.1
PLANTATION CROPS	3.6	104.0	109.4	115.7	104.0	113.2	113.2	123.0	122.7
Sugarcane (gur)	8.7	113.7	122.8	101.6	89.5	115.9	119.8	137.2	138.1
Tobacco	1.9	97.3	78.0	91.3	101.5	95.1	112.9	113.7	89.4
Potatoes	1.0	107.4	110.8	123.9	126.5	111.1	120.3	111.6	126.3
Pepper (Black)	1.2	97.2	107.5	102.8	113.3	127.3	132.6	131.6	128.2
Chillies (Dry)	2.0	119.4	118.4	98.0	104.9	131.9	122.9	120.8	121.5
Ginger (Dry)	0.3	94.4	96.0	89.6	90.3	94.3	105.7	102.3	105.0
MISCELLANEOUS CROPS	15.1	110.3	114.0	101.5	97.4	115.8	120.1	129.2	127.5
NON-FOODGRAINS	33.1	105.9	110.5	103.8	104.7	120.9	119.9	131.5	129.5
ALL COMMODITIES	100.0	95.6 •	97.5	102.0	114.3	117.0	116.8	124.3	115.9

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
149.0	134.7	142.1	147.5	149.4	156.3	181.6	128.0	133.5	173.5	135.5
123.1	89.8	177.2	118.6	118.6	105.9	116.6	100.7	98.6	105.5	98.3
123.3	130.8	165.7	165.3	160.3	112.5	181.4	158.9	151.0	192.8	193.3
104.7	106.8	95.3	111.1	103.1	90.9	118.6	80.5	82.4	105.2	84.5
85.9	88.2	82.1	83.6	76.2	78.4	79.2	59.3	62.2	68.7	63.1
136.8	125.3	134.0	140.0	142.6	134.5	166.5	125.3	125.6	161.5	137.1
175.8	132.4	202.1	174.9	189.8	208.6	219.0	183.7	191.8	210.3	203.2
168.7	137.4	125.3	132.7	165.0	184.3	183.9	135.6	162.5	191.1	92.6
255.9	172.2	168.8	280.6	260.7	283.7	299.1	192.3	182.6	190.3	135.6
175.8	136.6	176.0	187.5	193.0	206.0	209.4	169.3	182.1	203.2	164.3
119.4	122.7	120.9	132.4	130.5	130.4	140.2	137.9	141.5	144.8	142.8
240.8	259.6	246.4	230.4	237.7	235.5	269.0	282.1	347.2*	254.2*	321.7*
160.2	167.6	167.0	180.0	209.4	239.0	286.0	316.8	343.7	404.2	445.5
127.3	131.3	129.2	140.1	138.6	140.4	151.4	150.9	158.5	158.1	161.1
141.5	153.3	183.9	173.5	152.5	172.6	201.4	195.2	163.3	159.9	193.7
118.2	108.7	114.3	126.2	129.3	136.4	134.9	112.8	133.9	139.7	131.6
148.0	172.3	168.6	151.7	194.4	149.7	208.1	234.4	203.3	244.3	275.5
127.2	126.7	134.8	134.8	123.9	113.9	114.8	110.3	109.1	104.4	105.5
113.5	122.1	142.5	130.3	142.1	163.7	158.9	128.2	139.3	167.5	140.0
90.9	106.4	116.3	124.2	129.5	140.1	138.8	142.1	140.1	128.9	127.6
133.1	141.8	163.4	156.3	148.2	160.0	179.7	170.8	148.6	167.8	175.6
136.4	135.0	152.6	153.9	151.6	156.5	176.7	154.8	147.4	165.1	161.0
133.5	130.3	142.2	144.8	139.6	143.1	159.4	132.1	131.6	161.6	158.7

*Based on Provisional estimates.
The indices for 1965-66 to 1967-68 are generally based on Partially Revised Estimates, while those for 1968-69 are generally based on Final Estimates. The indices for these years are, therefore, subject to revision.

Note.

APPENDIX 16(c)
Index Number of Agricultural Production in India

Commodity/Group	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58	1958-59
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
I. Foodgrains									
Rice	87.1	92.2	98.6	116.7	105.2	110.8	114.2	100.2	117.8
Jowar	89.6	94.0	94.4	102.4	117.7	86.6	101.0	111.6	112.6
Bajra	86.0	73.7	81.5	102.4	87.8	88.5	74.2	98.4	98.4
Maise	87.6	100.3	112.1	110.3	111.5	99.6	115.9	109.2	104.2
Ragi	94.8	87.6	87.2	117.5	112.7	128.4	125.9	118.9	122.8
Small Millets	92.0	97.5	92.5	105.8	107.5	94.2	94.1	88.0	104.4
Kharif Cereals	88.2	90.7	93.6	107.9	101.9	103.0	109.0	99.8	112.8
Wheat	101.2	96.7	111.9	109.6	117.8	108.6	101.5	98.6	114.0
Barley	107.9	100.6	119.9	111.0	115.3	110.2	109.0	99.4	108.3
Rabi Cereals	102.6	97.4	113.4	109.8	117.5	105.7	103.9	99.7	114.3
CEREALS									
Gram	90.8	91.8	97.0	108.2	104.9	103.8	108.2	99.8	113.2
Tur	107.5	107.2	124.9	130.6	130.9	117.7	136.9	114.7	148.3
Other Pulses	98.2	93.1	88.3	96.5	89.0	101.4	108.0	76.4	84.2
	92.8	91.7	86.1	87.2	93.8	90.1	78.3	77.0	87.3
PULSES	99.8	97.5	100.9	104.6	107.4	101.4	104.8	90.8	111.2
FOODGRAINS									
	92.4	93.0	98.0	108.1	105.2	103.0	107.4	98.6	112.5

APPENDIX 16(c) (Contd.)
Index Number of Agricultural Production in India

1959-60	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
114.3	123.6	125.5	113.5	126.0	131.5	106.0	105.3	125.9	130.6
108.3	119.3	98.5	118.4	111.9	120.0	96.2	103.3	122.0	117.1
94.9	83.1	93.8	104.3	101.3	110.8	91.7	105.8	117.4	91.5
110.6	109.2	112.3	116.5	116.3	118.3	117.0	113.9	131.6	114.1
126.2	116.9	127.0	129.4	128.7	121.1	81.6	113.2	128.7	115.2
97.1	95.1	103.6	94.3	107.3	106.0	91.7	79.9	96.6	93.5
111.4	117.2	118.8	114.1	122.7	128.2	104.4	105.5	123.6	124.6
111.5	122.9	128.5	114.6	105.4	131.9	119.0	128.2	159.3	158.2
107.9	116.9	125.7	106.0	97.2	123.3	118.4	109.1	136.3	115.2
112.2	123.8	129.8	115.3	106.5	133.6	121.2	127.7	158.5	157.3
111.7	118.5	121.2	114.4	119.6	129.3	107.5	109.7	131.2	131.8
115.9	143.3	128.7	124.1	102.4	138.5	111.9	96.3	153.8	128.8
23.8	101.6	66.8	76.0	64.6	86.4	82.5	52.9	77.1	81.9
36.2	86.0	87.4	84.3	79.0	98.5	76.9	71.0	86.8	86.6
96.7	109.0	99.8	96.8	84.8	105.3	88.7	76.8	108.7	95.9
100.1	117.3	118.2	112.0	114.9	126.2	105.6	106.2	129.5	129.3

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
II. Non-Foodgrains									
Groundnut	89.7	75.2	70.8	93.9	88.7	87.1	91.4	85.1	94.7
Sesamum	94.3	87.8	92.0	101.6	105.9	94.2	93.2	84.4	112.7
Rapeseed and Mustard	88.4	94.0	97.6	93.1	102.0	80.6	98.5	92.8	102.2
Linseed	95.2	85.9	97.1	98.8	102.0	97.7	82.5	71.9	100.9
Castorseed	85.5	84.4	88.1	87.6	101.9	96.2	96.3	91.0	111.1
OILSEEDS	92.5	84.1	83.0	95.2	99.2	91.0	97.5	95.2	106.5
Cotton	92.9	89.7	93.9	107.1	106.9	93.8	111.4	110.0	108.8
Jute	87.6	90.2	95.3	88.8	88.8	90.9	84.6	86.1	102.0
Mesta	100.0	99.9	99.9	99.5	145.7	143.0	141.8	120.4	132.5
FIBRES	91.4	95.0	98.5	96.2	95.4	93.2	105.5	102.3	109.0
Tea	103.4	109.4	114.9	101.3	109.3	105.8	116.4	113.1	116.4
Coffee	108.4	106.6	117.4	150.1	147.1	185.2	194.9	208.7	199.8
Rubber	111.8	111.5	118.5	107.6	100.2	114.1	117.8	94.2	82.2
PLANTATION CROPS	105.0	110.2	115.2	102.3	108.4	107.9	117.4	112.3	108.4
Sugarcane (Gur)	97.7	92.9	86.2	93.2	105.7	95.7	98.8	98.4	107.2
Tobacco	94.7	87.6	87.6	95.7	95.5	96.8	94.4	86.5	108.5
Potatoes	104.9	103.8	118.6	115.2	100.3	110.7	91.3	92.1	102.5
Pepper (Black)	96.7	104.4	99.8	106.8	117.8	118.2	116.7	108.8	107.8
Chillies (Dry)	103.5	108.4	100.6	99.5	105.7	104.3	103.1	99.1	102.6
Ginger (Dry)	132.2	116.9	104.4	147.5	136.9	141.9	140.9	135.0	130.4
MISCELLANEOUS CROPS	98.2	96.3	91.8	97.1	111.5	105.8	106.8	104.4	114.0
NON-FOODGRAINS	95.6	91.1	88.3	90.3	94.9	91.7	97.8	96.8	102.0
ALL COMMODITIES	95.7	95.9	96.9	102.8	104.2	101.6	107.2	101.0	111.8

(11)	(12)	(13)	(14)	(15) ^c	(16)	(17)	(18)	(19)	(20)
83.1	87.4	85.1	81.6	90.3	98.0	68.6	72.8	91.4	76.0
86.6	73.3	82.6	96.2	90.9	97.1	84.1	73.1	82.3	84.5
87.7	112.1	102.0	100.0	72.0	121.6	106.2	98.0	115.9	126.0
83.1	81.8	86.3	83.2	70.0	89.2	71.6	64.1	91.0	78.1
106.3	104.5	101.8	96.1	96.0	106.5	85.9	91.9	92.6	97.2
90.9	98.5	96.0	94.2	92.0	110.7	85.1	84.9	104.5	95.3
89.5	130.9	108.0	127.3	125.1	120.1	114.0	120.7	129.7	130.4
93.9	99.0	91.8	100.0	102.6	94.5	84.5	96.1	102.6	82.5
111.6	117.1	125.6	125.6	134.4	123.6	107.9	107.9	112.9	93.1
92.8	116.2	113.1	120.9	122.0	123.0	105.4	114.4	124.3	108.8
116.2	114.4	126.3	123.1	122.4	130.2	123.0	125.1	129.5	123.4
209.9	194.2	175.6	181.7	188.3	184.8	194.8	241.6*	176.9*	223.9*
76.1	76.8	76.3	85.7	85.3	89.9	95.8	103.2	117.1	129.1*
106.0	104.5	110.6	108.3	106.1	109.5	106.0	110.9	110.6	110.5
105.9	112.4	104.3	100.4	113.4	114.3	103.7	98.4	113.9	116.2
92.6	109.0	105.0	111.1	107.7	115.4	105.4	109.9	114.7	111.0
111.3	109.7	103.6	113.6	88.7	118.5	117.3	103.3	117.1	123.4
104.3	104.1	104.2	109.2	88.4	89.6	85.6	84.5	81.2	79.6
103.6	109.7	110.9	117.6	114.7	116.3	103.2	101.7	111.6	108.7
132.0	134.5	142.4	143.6	146.4	145.5	154.0	146.4	143.5	145.5
111.9	117.7	113.1	111.7	115.9	120.9	111.6	105.8	117.1	120.2
97.1	108.1	102.1	100.4	103.0	113.1	101.5	97.9	106.0	109.6
108.0	117.7	117.0	112.3	115.4	127.2	109.6	107.9	126.0	126.3

*Based on provisional estimates.

The indices for 1965-66 to 1967-68 are generally based on Partially Revised Estimates while those for 1968-69 are generally based on Final Estimates. The indices for these years are, therefore, subject to revision.

Note.

APPENDIX 17
COST STUDIES UNDERTAKEN BY VARIOUS AGENCIES IN
DIFFERENT REGIONS

<i>Crop/State</i>	<i>Period</i>	<i>Sponsoring agency</i>	<i>No. of districts covered</i>	<i>No. of sample villages</i>	<i>No. of holdings</i>
(1)	(2)	(3)	(4)	(5)	(6)
<i>Paddy</i>					
Andhra Pradesh	1957-58 to 1959-60	Directorate of E. & S.	1	10	100
	1961-62 to 1963-64	Govt. of Andhra Pradesh	3	60	540
	1963-64 to 1965-66	I.C.J.C.	4	35	8-10 in each village
Assam	1963	Govt. of Assam	4	—	1,360
Bihar	1957-58 to 1959-60	Directorate of E. & S.	1	10	100
	1960-61 to 1962-63	Directorate of E. & S.	1	10	150
	1963-64 to 1965-66	I.C.J.C.	3	35	8-10 in each village
	1962-63	Govt. of Bihar	Important agri-cultural regions	6	108
Gujarat	1966-67 to 1968-69	Directorate of E. & S.	1	15	150
Kerala	1962-63 to 1964-65	Do.	2	10	100
Madhya Pradesh	1962-63 to 1964-65	Do.	1	10	100
Madras	1954-55 to 1956-57	Do.	2	20	200
	1966-67 to 1968-69	Do.	1	15	465
	1962-63 to 1963-64	Govt. of Madras	2	—	=

(1)	(2)	(3)	(4)	(5)	(6)
<i>Paddy (Contd.)</i>					
Mysore	1959-60 to 1961-62	Directorate of E. & S.	1	10	100
	1963-64 to 1965-66	Govt. of Mysore	2	20	200
	1957-58 to 1959-60	Do.	1	10	100
	1951-52 to 1955-56	Board of Economic Enquiry, Punjab	12	21	—
Uttar Pradesh	1954-55 to 1956-57	Directorate of E. & S.	2	20	200
	1964-65	Govt. of U.P.	2	—	320
West Bengal	1954-55 to 1956-57	Directorate of E. & S.	21	20	200
	1962-63 to 1963-64	Govt. of West Bengal	5	15	120
	1963-64 to 1965-66	I.C.J.C.	10	50	8-10 in each village
<i>Wheat</i>					
Bihar	1957-58 to 1959-60	Directorate of E. & S.	1	10	100
	1960-61 to 1962-63	Do.	1	10	150
	1962-63	Govt. of Bihar	Important agri-cultural regions	6	108
Maharashtra	1954-55 to 1956-57	Directorate of E. & S.	2	16	160
	1955-56 to 1956-57	Do.	2	20	160
	1966-67 to 1968-69	Do.	1	—	—
Punjab	1954-55 to 1956-57	Do.	23	20	200
	1961-62 to 1963-64	Govt. of Punjab	3	20	200

1. Covered also under the Govt. of West Bengal and I.C.J.C. Studies.
2. Covered also under the Board of Economic Enquiry Studies.

(1)	(2)	(3)	(4)	(5)	(6)
<i>Wheat (Contd.)</i>					
	1960-61 to 1962-63	I.C.O.C. & I.C.C.C.	4	40	300
	1951-52 to 1955-56	Board of Economic Enquiry, Punjab.	12	21	—
Rajasthan	1962-63 to 1964-65	Directorate of E. & S.	1	10	100
Uttar Pradesh ³	1954-55 to 1956-57	Do.	2	20	200
	1966-67 to 1968-69	Do.	2	15	150
	1964-65	Govt. of U.P.	2	—	—
	1962-63 to 1963-64	Govt. of W. Bengal	5	15	120
<i>Jowar</i>					
Andhra Pradesh	1961-62 to 1962-63	Govt. of A. Pradesh	3	60	540
Gujarat	1960-61 to 1962-63	I.C.O.C. & I.C.C.C.	7	40	300
Madras	1954-55 to 1956-57	Directorate of E. & S.	2	20	200
Maharashtra ⁴	1954-55 to 1956-57	Do.	1	8	80
	1966-67 to 1968-69	Do.	1	—	—
	1960-61 to 1962-63	I.C.O.C. & I.C.C.C.	6	40	200
	1960-61 to 1962-63	Do.	3	40	300
Mysore	1960-61 to 1962-63	Do.	3	40	300
Punjab	1961-62 to 1963-64	Govt. of Punjab	3	20	200
Rajasthan	1962-63 to 1964-65	Do.	1	10	100
<i>Bajra</i>					
Madras	1954-55 to 1956-57	Do.	2	20	200

3. One district is common in the two Studies of Directorate of E. & S.

4. One district is common in the two Studies of the Directorate of E. & S.

(1)	(2)	(3)	(4)	(5)	(6)
<i>Bajra (Contd.)</i>					
Maharashtra ⁴	1954-55 to 1956-57	Do.	2	16	160
	1968-67 to 1968-69	Do.	1	—	—
Punjab	1961-62 to 1963-64	Do.	3	20	200
Rajasthan	1962-63 to 1964-65	Do.	1	10	100
<i>Maize</i>					
Bihar	1957-58 to 1959-60	Do.	1	10	100
	1962-63	Govt. of Bihar	Important agri- cultural regions	6	108
Uttar Pradesh	1954-55 to 1956-57	Directorate of E. & S.	2	20	200
Punjab	1951-52 to 1955-56	Board of Economic Enquiry, Punjab.	12	21	—
<i>Ragi</i>					
Andhra Pradesh	1961-62 to 1963-64	Govt. of Andhra Pradesh	3	60	540
Madras	1954-55 to 1956-57	Directorate of E. & S.	2	20	200
Mysore	1959-60 to 1961-62	Do.	1	10	100
	1962-63 to 1964-65	Do.	1	20	240
<i>Barley</i>					
Uttar Pradesh	1964-65	Govt. of U.P.	2	—	320
<i>Gram</i>					
Bihar	1962-63	Govt. of Bihar	Important agri- cultural regions	6	108

⁴ One district is common in the two Studies of the Directorate of E. & S.

(1)	(2)	(3)	(4)	(5)	(6)
<i>Gram (Contd.)</i>					
Maharashtra ⁵	1954-55 to	Directorate of E. & S.	2	16	160
	1956-57				
	1966-67 to	Do.	1	—	—
	1968-69				
Punjab	1961-62 to	Govt. of Punjab	3	20	200
	1963-64				
	1951-52 to	Board of Economic	12	21	—
	1955-56	Enquiry, Punjab.			
Uttar Pradesh	1954-55 to	Directorate of E. & S.	2	20	200
	1956-57				
	1964-65	Govt. of U.P.	2		320
<i>Wheat and Gram</i>					
Bihar	1957-58 to	Directorate of E. & S.	1	10	100
	1959-60				
	1960-61 to	Do.	1	10	150
	1962-63				
Punjab	1951-52 to	Board of Economic	12	21	—
	1955-56	Enquiry, Punjab.			
	1954-55 to	Directorate of E. & S.	28	20	200
	1956-57				
<i>Sugarcane</i>					
Andhra Pradesh ⁷	1955-56 to	I.C.S.C.	5	15	180
	1957-58				
	1961-62 to	Govt. of Andhra Pradesh	3	60	640
	1963-64				
Bihar (North)	1955-56 to	I.C.S.C.	4	30	360
	1957-58				
Bihar (South)	1955-56 to	Do.	3	15	180
	1957-58				
Maharashtra	1956-57 to	Do.	5	15	180
	1958-59				

5. One district is common to Studies of Directorate of E. & S.

6. Covered also under the Board of Economic Enquiry Studies.

7. One district is common in Studies of the I.C.S.C. and Govt. of Andhra Pradesh.

(1)	(2)	(3)	(4)	(5)	(6)
<i>Sugarcane (Contd.)</i>					
Mysore	1963-64 to	Govt. of Mysore	1	20	200
	1965-68				
	1960-61 to	I.C.S.C.	5	15	180
	1962-33				
Orissa	1957-58 to	Directorate of E. & S.	1	10	100
	1959-60				
Punjab ⁸	1961-62 to	Govt. of Punjab	3	20	200
	1963-64				
	1955-56 to	I.C.S.C.	3	12	144
	1957-55				
	1951-52 to	Board of Eco. Enquiry.	12	21	—
U.P. (Western) ⁹	1955-56 to	I.C.S.C.	11	30	360
	1957-58				
	(Central)	1955-56 to Do.	7	15	180
	1957-58				
	(Eastern)	1955-56 to Do.	5	30	360
	1957-58				
	1954-55 to	Directorate of E. & S.	210	20	200
	1956-57				
	1966-67 to	Do.	2	—	—
	1968-69				
West Bengal	1964-65	Govt. of U.P.	2	—	320
	1962-63 to	Govt. of West Bengal	5	15	120
	1963-64				
Cotton					
Gujarat	1960-61 to	I.C.O.C. & I.C.C.C.	7	40	300
	1962-63				
Madras	1954-55 to	Directorate of E. & S.	2	20	200
	1956-57				
Maharashtra	1960-61 to	I.C.O.C. & I.C.C.C.	6	40	200
	1962-63				

8. Two districts are common in the Govt. of Punjab and the Board of Economic Enquiry, Punjab Studies.

9. Three districts are common in the Studies of the I.C.S.C. Study and the Directorate of E. & S. Studies.

10. One district is common in both the Studies of Directorate of E. & S.

(1)	(2)	(3)	(4)	(5)	(6)
<i>Cotton (Contd.)</i>					
Mysore	1960-61 to 1962-63	I.C.O.C. & I.C.C.C.	3	40	300
Punjab ¹¹	1954-55 to 1956-57	Directorate of E. & S.	2	20	200
	1960-61 to 1962-63	I.C.O.C. & I.C.C.C.	4	40	300
	1951-52 to 1955-56	Board of Economic Enquiry, Punjab.	12	21	—
Uttar Pradesh	1954-55 to 1956-57	Directorate of E. & S.	2	20	200
<i>Groundnut</i>					
Andhra Pradesh	1961-62 to 1963-64	Govt. of Andhra Pradesh	3	60	540
Gujarat	1960-61 to 1962-63	I.C.O.C. & I.C.C.C.	7	38	300
Madras	1954-55 to 1956-57	Directorate of E. & S.	2	20	200
Maharashtra	1960-61 to 1962-63	I.C.O.C. & I.C.C.C.	6	40	200
Mysore	1960-61 to 1962-63	Do.	3	40	300
Orissa	1957-58 to 1959-60	Directorate of E. & S.	1	10	100
Punjab	1960-61 to 1962-63	I.C.O.C. & I.C.C.C.	4	40	300
<i>Jute</i>					
Assam ¹²	1963-64 to 1965-66	I.C.J.C.	4	35	8-10 hold-ings in each village
	1963	Govt. of Assam	4	—	1360
Bihar	1963	I.C.J.C.	3	35	1360

11. Two districts are common in the Studies of the Board of Economic Enquiry, Punjab and Directorate of E. & S. Studies.

12. The four districts are common between the two Studies of the ICJC and the Government of Assam.

(1)	(2)	(3)	(4)	(5)	(6)
<i>Jute (Contd.)</i>					
West Bengal ¹³	1963	Do.	10	50	1360
	1954-55 to 1956-57	Directorate of E. & S.	2	20	200
	1962-63 to 1963-64	Govt. of W. Bengal	5	15	120
<i>Tobacco</i>					
Andhra Pradesh	1957-58 to 1959-60	Directorate of E. & S.	1	10	100
<i>Pulses</i>					
West Bengal	1954-55 to 1956-57	Do.	2	20	200
Orissa	1957-58 to 1959-60	Do.	1	10	100
<i>Chillies</i>					
Bihar	1957-58 to 1959-60	Do.	1	10	100
<i>Arhar</i>					
Bihar	1957-58 to 1959-60	Directorate of E. & S.	1	10	100
<i>Potato</i>					
Bihar	1962-63	Govt. of Bihar	Impor- tant agri- cultural regions	6	108
Mysore	1959-60 to 1961-62	Directorate of E. & S.	1	10	100
W. Bengal	1962-63 to 1963-64	Govt. of West Bengal	5	15	120

13. Two districts are common between the Studies of the Directorate of E. & S., I.C.J.C. and the Govt. of West Bengal.

Directorate of E. & S. = Directorate of Economics and Statistics

I.C.S.C. = Indian Central Sugarcane Committee

I.C.J.C. = Indian Central Jute Committee

I.C.O.C. = Indian Central Oilseeds Committee

I.C.C.C. = Indian Central Cotton Committee

Source: First Report of the Standing Technical Committee on Indices of Input Costs, Ministry of Food and Agriculture, November 1967.

APPENDIX 18

GAPS IN BASIC AGRICULTURAL STATISTICS NEEDED FOR ESTIMATION OF NATIONAL INCOME AND RELATED AGGREGATES

Agriculture :

1. Yield rates of minor crops and important by-products.
2. Disposal of commodities over time and by kind of use.
3. Cost of cultivation with separate provision for hired labour charges, rent and interest.
4. Value of fixed capital assets, capital formation and depreciation.
5. Prices received by producers.

Livestock :

1. Intercensal changes in livestock numbers and yield rates of principal products per animal.
2. Cost of production, etc.
3. Disposal of commodities by type of use.
4. Value of fixed capital assets, capital formation and depreciation.
5. Prices received by producers.

Forestry :

1. Quantum of unauthorized removals of timber, fuel and other minor products.
2. Cost of production etc.
3. Value of fixed capital assets, capital formation and depreciation.
4. Prices received by producers.
5. Changes in stocks.

Fishery :

1. Annual catch of inland fish by professional fishermen.
2. Quantum of subsistence fishing.
3. Cost of production, etc.
4. Value of fixed capital assets, capital formation and depreciation.
5. Prices received by producers separately for marine and inland fish.



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